vol 18 no 4 APRIL 61

American Journal of Hospital Pharmacy

official publication of the American Society of Hospital Pharmacists

FORMERLY The BULLETIN

PLANNING A STERILE TECHNICS LABORATORY

AMSCO equipped Solution Rooms have one "Common Factor"...

they save hospitals thousands of dollars every year

Of the many procedure changes possible in modern hospitals, *none will save more dollars annually* than the conversion to hospital-made solutions.

Hundreds of hospitals . . . seeking to cut costs while maintaining rigidly high standards . . . have turned to Amsco for objective recommendations concerning the proper "Solutions Program" *for their particular needs.*

It is well known that 75% of hospital solutions are used for external or irrigating purposes. The balance of course, are lifesaving parenterals. It's equally well known by hospitals currently benefiting from an Amsco designed and equipped Solution Preparation Room that these same External or Surgical Solutions... and many Parenterals ... *can be made at one-quarter* the cost of commercial solutions.

Many hospitals take *this* practical approach:

- **They produce their own External Solutions and many Parenterals in an Amsco equipped Solution Preparation Room located in the Central Service Department or Pharmacy. Critical Electrolyte Solutions, Blood Transfusing Plastic Bags, Bottles and Sets, and Disposable Solution Administration Sets are purchased from AMSCO LABORATORIES... a division of the American Sterilizer Company.**
- **Others produce only External Solutions... depending upon AMSCO LABORATORIES for all their Parenterals, Disposable Sets, etc.**

Why not ask your Amsco man to discuss an OBJECTIVE, correctly-balanced "Solution Program" for *your* hospital? It will be based *solely* on the specific solution needs, available floor space and your existing equipment. The results of our studied recommendations will involve minimum capital investment . . . and a significant decrease in your annual solutions costs.

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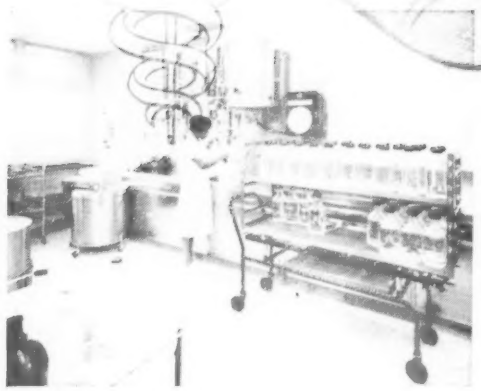

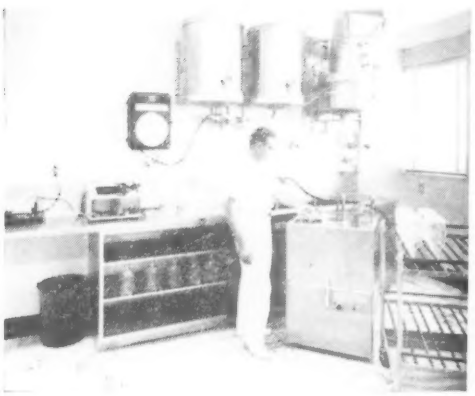

The AMERICAN SOCIETY OF HOSPITAL PHARMACISTS, an affiliate of the American Pharmaceutical Association, is a national organization devoted to the profession of hospital pharmacy and dedicated to the improvement of pharmaceutical service in the interest of better patient care in hospitals.

MEMBERSHIP in the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS and the American Pharmaceutical Association is open to all practicing hospital pharmacists. With membership are included subscriptions to the AMERICAN JOURNAL OF HOSPITAL PHARMACY and to the *Journal of the American Pharmaceutical Association, Pract. Pharm. Ed.*, as well as the several services of each organization.

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American Journal of Hospital Pharmacy

American Society of Hospital Pharmacists

VOLUME 18 NUMBER 4 APRIL, 1961

articles

departments

AN AMES CLINIQUICK®

CLINICAL BRIEFS FOR MODERN PRACTICE

Postpone final diagnosis pending the "lab reports"!

Frequently in the busy physician's office, a final diagnosis cannot be made until laboratory results have been interpreted. Ordinarily, these reports are not available for hours—in some cases even days. Very often it is desirable to reach a more definite conclusion before the patient leaves your office. As a valuable adjunct to your diagnosis, examination of the urine may throw light upon many metabolic, organic, and physiologic disturbances which may be obscured without laboratory assistance.

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Source: (1) Free, H. M.; Collins, G. F., and Free, A. H.: Clin. Chem. *6*:352 (Aug.) 1960. (2) Fetter, M. C.; Rebar, J., Jr., and Metzler, I.: Am. J. M. Technol. *25*:401 (Nov.-Dec.) 1959.

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And against many of the troublesome "staph" strains—a group which shows increasing resistance to penicillin and certain other antibiotics—Erythrocin continues to provide bactericidal activity. Yet, as potent as Erythrocin is, *it rarely has a disturbing effect on normal gastro-intestinal flora.* Comes in easy-to-swallow Filmtabs®, 100 and 250 mg.

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Can you afford to give away medication?

As hospital costs mount, it is becoming increasingly evident that the beneficiaries of hospital services—the patients—must assume their fair share of the costs incurred. For this to occur, the hospitals must be able to account scrupulously, either to the patients or to the various prepaid hospital plans, for all services and medication.

Old-style injections too complicated

Because accounting and billing for medication withdrawn from multidose vials has been so difficult and time consuming, many hospitals have virtually been forced to write off the cost of common injectables or, at best, to estimate them. Yet it is clear that few hospitals can afford to give away medication or to rely on estimates, which are often unacceptable by the prepaid plans.

TUBEX lets you charge fairly

The TUBEX system provides individual, unitized doses of medication in tamper-proof cartridge form. It's an easy matter to keep track of medication dispensed and administered. ***You know just what each patient received, and precisely how much. And you can charge accordingly, with unassailable fairness.***

The need to charge accurately and as completely as possible is being met by the TUBEX system in more and more hospitals across the nation. Typical of the accolades the system has won is the following, excerpted from *The Bulletin of the Parenteral Drug Association:*

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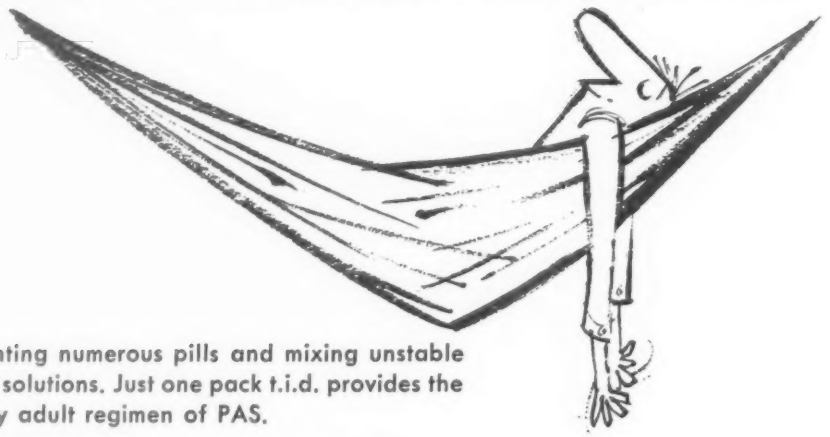

ELIMINATE . . . counting numerous pills and mixing unstable PAS solutions. Just one pack t.i.d. provides the daily adult regimen of PAS.

CUT DOWN . . the work of busy pharmacists and nurses.

REDUCE . . . . the time required to dispense PAS products. Each Pasna® Pack is a pre-measured, overwrapped dose of sodium aminosalicylate granules packaged in convenient boxes of 90 packs each or economical hospital containers of 800 packs each.

REDUCE . . . . the problem of storage and inventory. The moisture- and light-resistant cellophane packs prevent deterioration of Pasna Granules for a period in excess of one year from the date of manufacture, guaranteeing the freshness of the sodium PAS. Pasna® Granules reduce gastric upset commonly associated with PAS therapy; thus, numerous forms of PAS normally stocked by hospital pharmacies can be eliminated.

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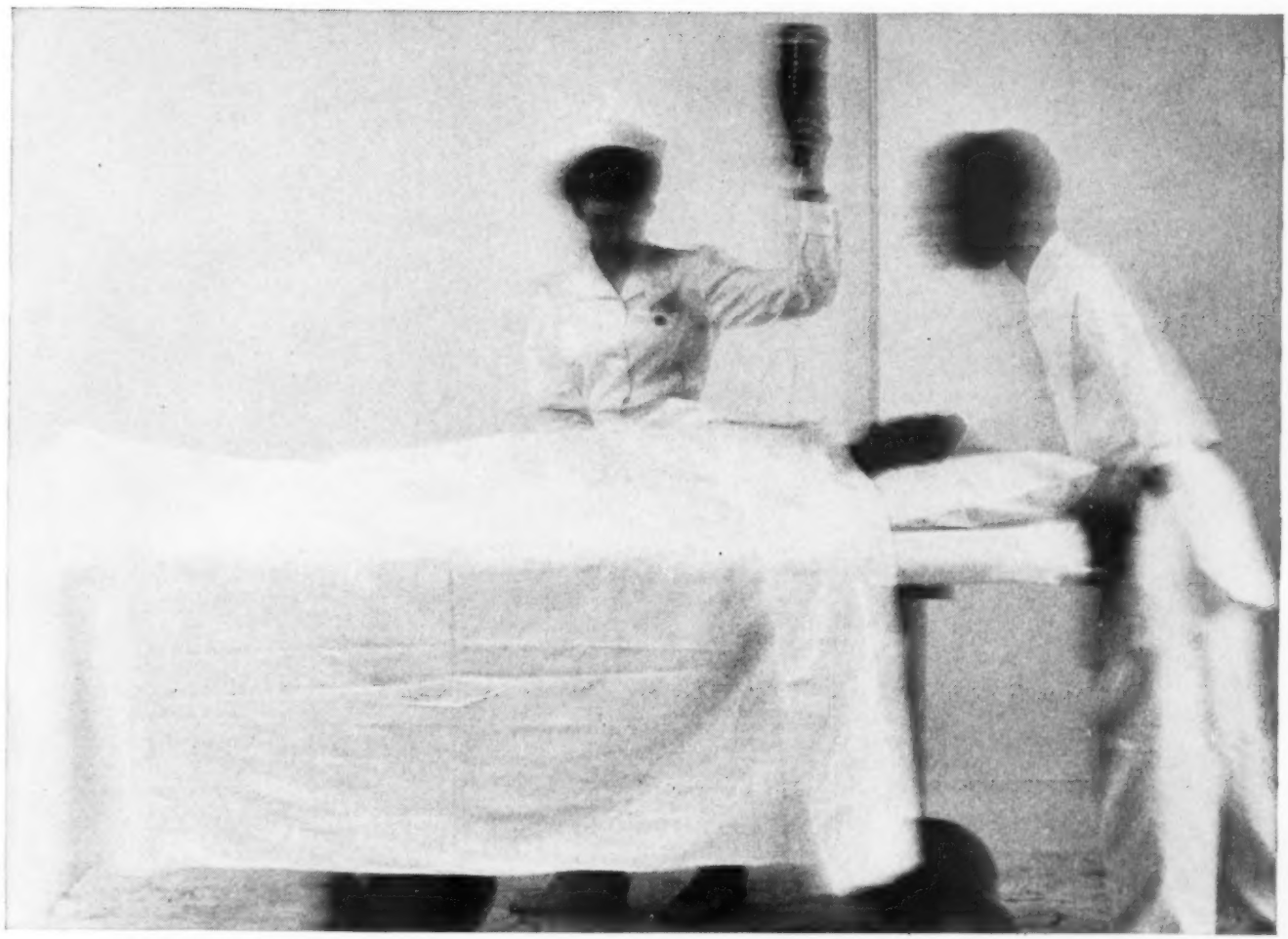
Also available: PASCA® PACK GRANULES . . . the calcium salt of PAS in granule form.

*Pharmacy International, April, 1952 Page 26

when standard antishock measures fail



Indications and effects: Solu-Cortef is indicated when intense corticosteroid effect is necessary in various situations including acute adrenal cortical insufficiency, bilateral adrenalectomy, shock unresponsive to standard antishock therapy, acute hypersensitivity reactions, disseminated lupus erythematosus in relapse, and overwhelming infections with severe toxicity. *Administration and dosage:* Sterile Solu-Cortef may be administered intravenously or intramuscularly, the intravenous route being preferred in emergencies. The initial dose is 100 mg. or 250 mg., depending on the severity of the condition, injected over a period of one-half to one minute. This dose may be repeated at intervals of one, three, six and ten hours, depending on the response and clinical condition.

Precautions and contraindications: Careful management is required, especially during sustained therapy, to guard against untoward manifestations such as sodium retention, edema, excessive potassium loss, and negative nitrogen balance. Solu-Cortef is contraindicated (except for emergency replacement therapy in acute adrenal cortical insufficiency) in patients with tuberculosis, herpes simplex keratitis, chronic nephritis, acute psychosis, Cushing's syndrome, peptic ulcer, and predisposition to thrombophlebitis. Existence of congestive heart failure, hypertension, diabetes, osteoporosis, or chronic psychiatric disorders requires that Solu-Cortef be administered with extreme caution. In the presence of infection, the causative organism must be brought under control with appropriate antibiotics; otherwise Solu-Cortef should be discontinued.

Supplied: In 2 cc. Mix-O-Vial* containing 250 mg. or 100 mg. hydrocortisone (as hydrocortisone sodium succinate), and in 10 cc. vial containing 100 mg. hydrocortisone (as hydrocortisone sodium succinate) per vial.

100 mg. (plain vial)
Each vial contains:

Hydrocortisone (as hydrocortisone sodium succinate)	100 mg.
Sodium biphosphate	0.8 mg.
Sodium phosphate, exsiccated	8.73 mg.

Also available in carton with one 2 cc. ampoule injectable sterile water.

250 mg. Mix-O-Vial
Each Mix-O-Vial contains:

Hydrocortisone (as hydrocortisone sodium succinate)	250 mg.
Sodium biphosphate	2 mg.
Sodium phosphate, exsiccated	21.83 mg.
Methylparaben	2.34 mg.
Propylparaben	0.27 mg.
Water for Injection	1.8 cc.

100 mg. Mix-O-Vial
Each Mix-O-Vial contains:

Hydrocortisone (as hydrocortisone sodium succinate)	100 mg.
Sodium biphosphate	0.8 mg.
Sodium phosphate, exsiccated	8.73 mg.
Methylparaben	2.34 mg.
Propylparaben	0.27 mg.
Water for Injection	1.8 cc.

In shock resulting from trauma, surgery, or overwhelming infection, Solu-Cortef* triggers vasopressor effects. As a result, patients often respond to Solu-Cortef when standard antishock measures have failed.

*Trademark, Reg. U. S. Pat. Off.

restore and maintain hemodynamics with

Solu-Cortef

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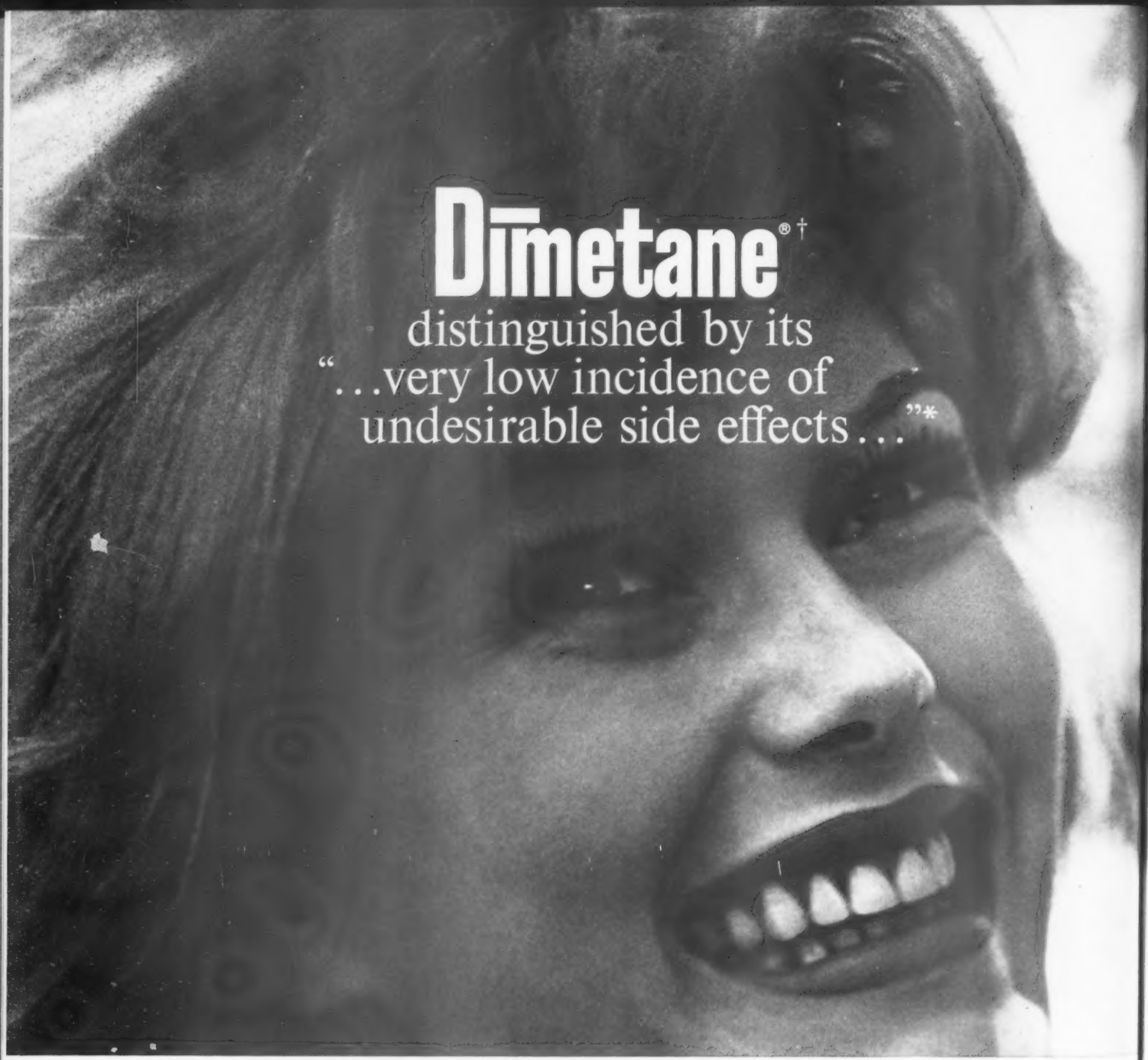

even in allergic infants

FROM A CLINICAL STUDY* IN ANNALS OF ALLERGY

Patients	200 infants and children, ages 2 months to 14 years
Diagnosis	Perennial allergic rhinitis
Therapy	Dimetane Elixir
Results	in 149, *good* results / in 40, *fair* results
Side Effects	Encountered in *only* 7 patients (in all except one, the side effect was mild drowsiness)

In allergic patients *of all ages,* Dimetane has been shown to work with an effectiveness rate of about 90% and to produce an exceptionally low incidence of side effects. Complete clinical data are available on request to the Medical Department. *Supplied:* DIMETANE Extentabs® (12 mg.), Tablets (4 mg.), Elixir (2 mg./5 cc.), new DIMETANE-TEN Injectable (10 mg./cc.) or new DIMETANE-100 Injectable (100 mg./cc.).

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*MC GOVERN, J. P., MC ELHENNEY, T. R., HALL, T. R., AND BURDON, K.D.: ANNALS OF ALLERGY 17:915, 1959.

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† PARABROMDYLAMINE MALEATE

For the build-up in convalescence

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Therapeutic dosage of B-Complex plus 500 mg. of Vitamin C

Unsurpassed stability. As coatings are applied without water, deterioration due to moisture is virtually eliminated. Stability is enhanced; potency is protected. **Easier, more pleasant to take.** SURBEX-T tablets are up to 30% smaller; have a pleasant taste; and are non-caloric. Vitamin odor and aftertaste are eliminated.

Each Filmtab SURBEX-T represents:

Thiamine Mononitrate (B_1)	15 mg.
Riboflavin (B_2)	10 mg.
Nicotinamide	100 mg.
Pyridoxine Hydrochloride	5 mg.
Cobalamin (Vitamin B_{12})	4 mcg.
Calcium Pantothenate (as calcium pantothenate racemic)	20 mg.
Ascorbic Acid (as sodium ascorbate)	500 mg.
Desiccated Liver, N. F.	75 mg.
Liver Fraction 2, N. F.	75 mg.

Supplied in bottles of 100 and 1000

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Filmtab coatings protect this full range of Abbott nutritional supplements:

SUR-BEX® WITH C. Smaller dosages of the essential B-Complex and C. Table bottles of 60. Also in bottles of 100, 500 and 1000.

DAYTEENS™ To help insure optimal nutrition in growing teenagers. Table bottles of 100, bottles of 250, 1000.

Potent maintenance formulas —ideal for those who are "nutritionally run-down"

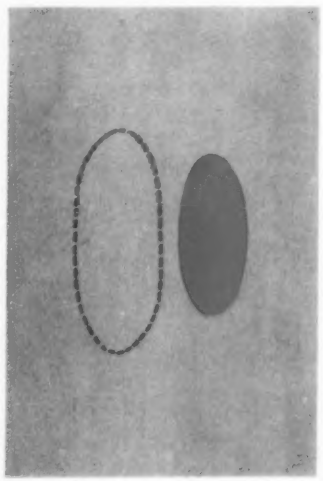
DAYALETS® Table bottles of 100. Bottles of 50, 250, 1000.

DAYALETS-M® Apothecary bottles of 100 and 250. Also in bottles of 1000.

Therapeutic formulas for more severe deficiencies—illness, infection, etc.

OPTILETS® & OPTILETS-M® Table bottles of 30 and 100. Bottles of 1000.

Filmtab® Coating Advantages in a Nutshell

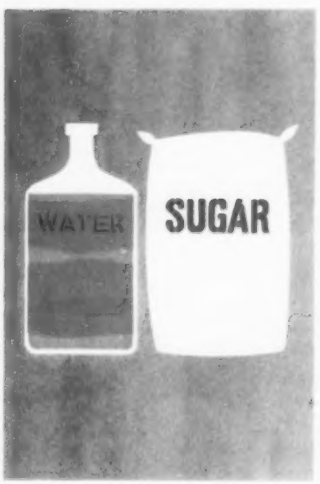


Tablets are easier to swallow, up to 30% smaller.

Vitamin after-taste and odor are eliminated.

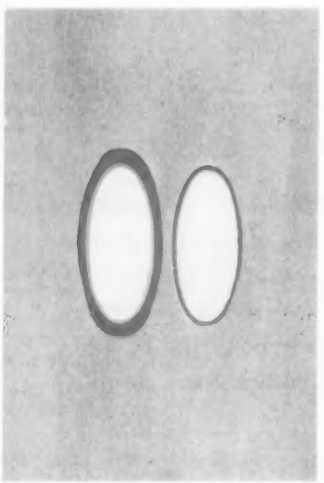
Tablets are pleasant tasting, non-caloric, come in a rainbow of cheerful colors.

Breakage and cracking are less likely. (Sugar coatings are crystalline, and more brittle.)



In contrast with sugar coatings, no water is used in manufacture.

This eliminates the need of protective subseals, and chances of moisture seepage through imperfections.



Absorption is speeded as sugar's bulk and subseals are eliminated.

Vitamins are readily available at proximal receptor sites.

NET RESULT: Potency is assured for a longer time.
The patient gets what he pays for—and what you prescribe.

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Your surgical convalescent feels better because he is better with

Durabolin®

(Nandrolone phenpropionate injection, ORGANON)

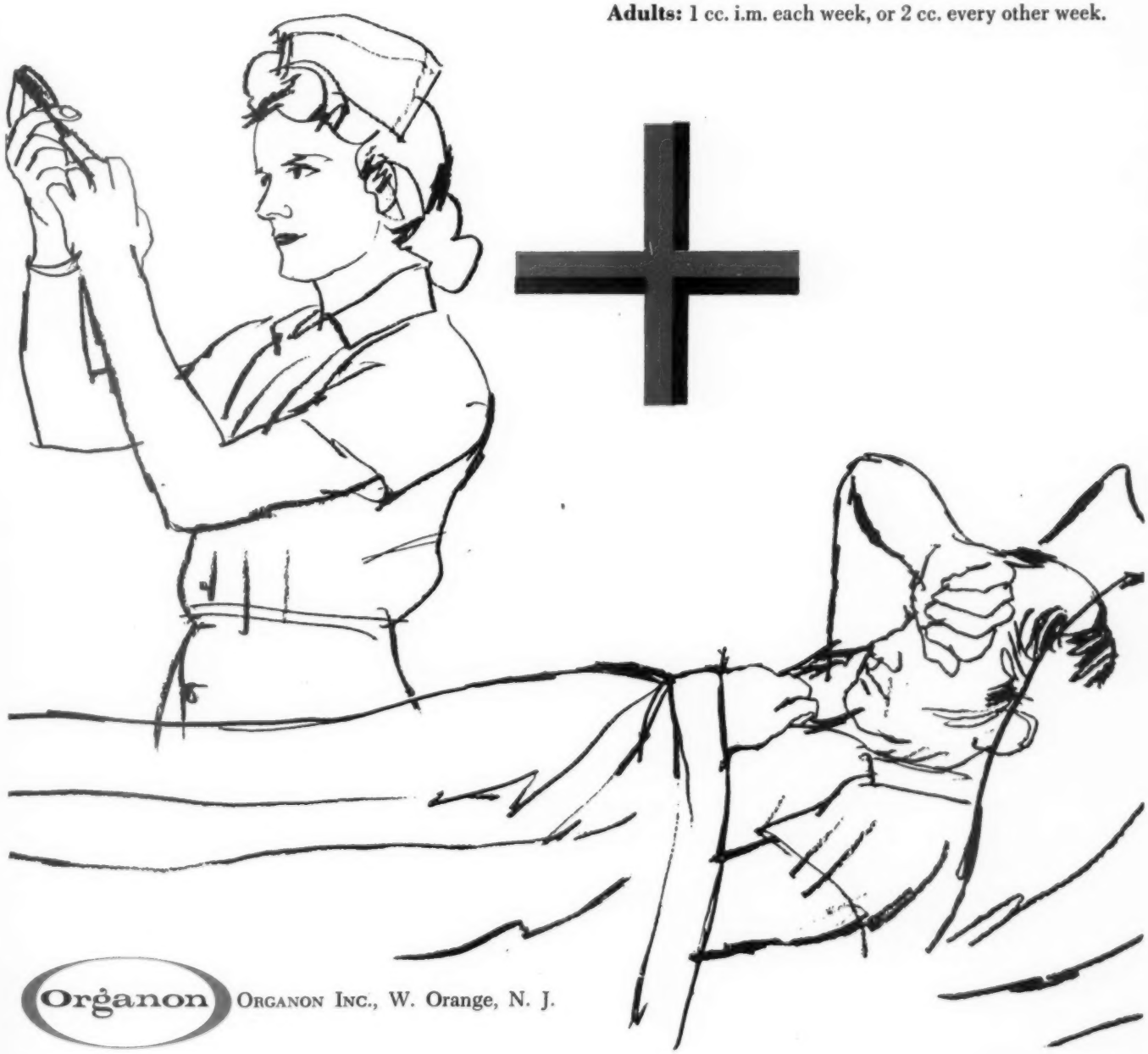
1 cc. once each week

for safe potent anabolic stimulation

+ to maintain positive nitrogen balance
+ to promote rapid wound healing
+ to restore appetite, strength, vitality
+ to shorten convalescence, save nursing time
+ to reduce the cost of recovery

Supplied: 1-cc. ampuls (box of three) and 5-cc. vials, 25 mg. nandrolone phenpropionate/cc.

Adults: 1 cc. i.m. each week, or 2 cc. every other week.



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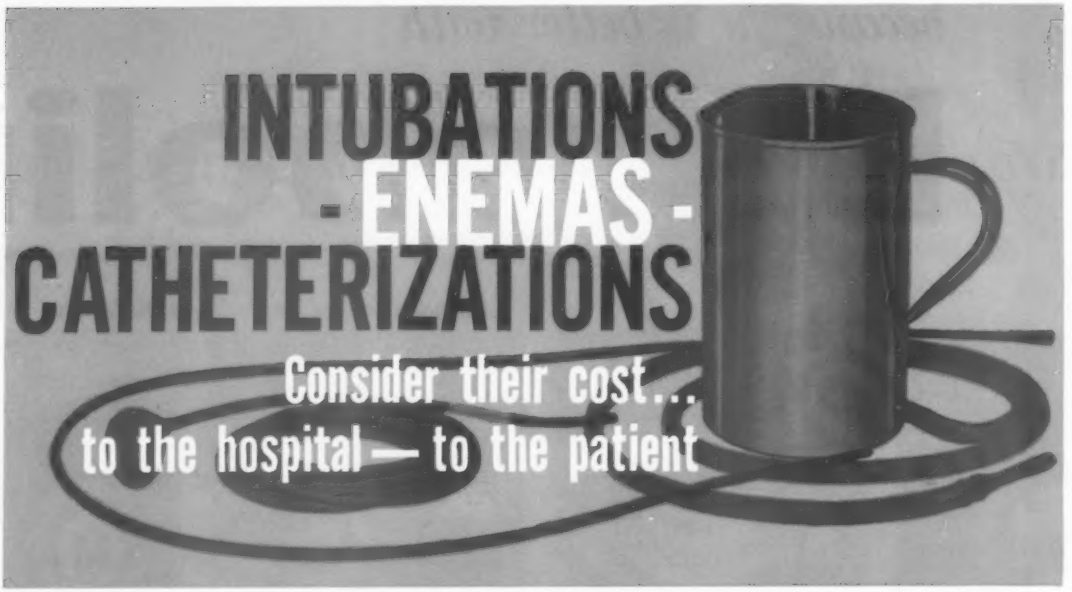
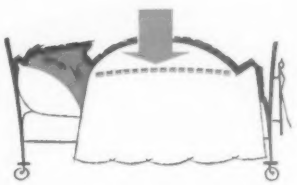


ILOPAN® reduces the need for them (*and, thereby, also aids patient comfort, recovery*)

Major abdominal surgery increases the body's need for pantothenic acid, according to available evidence. ILOPAN (dexpanthenol, W-T) provides pantothenic acid . . . to aid restoration of normal peristalsis . . . to prevent and relieve postoperative retention of flatus and feces, even paralytic ileus.



In 42 postsurgical patients, ILOPAN was responsible for a 50% reduction in enemas required, and reduction or earlier withdrawal of catheters, Levin and Cantor tubes.[1] In another 130-case study, ILOPAN was found frequently useful in prevention of postoperative ileus and its treatment, with urinary retention greatly reduced and catheterization requirements substantially diminished.[2]

ILOPAN produces no hyperperistalsis or cramping — no side effects — and can be routinely administered intramuscularly by the nurse. *For better recoveries, for patient comfort, for lower patient care costs, consider ILOPAN.*

1. Kareha, L.G. et al, W.Jour.S.O.&G., 66:220, 1958
2. Stone, M.L. et al, Amer.J.Surgery, 97:191, 1959

Supplied: 1 cc and 2 cc Ampuls, 10 cc Vials

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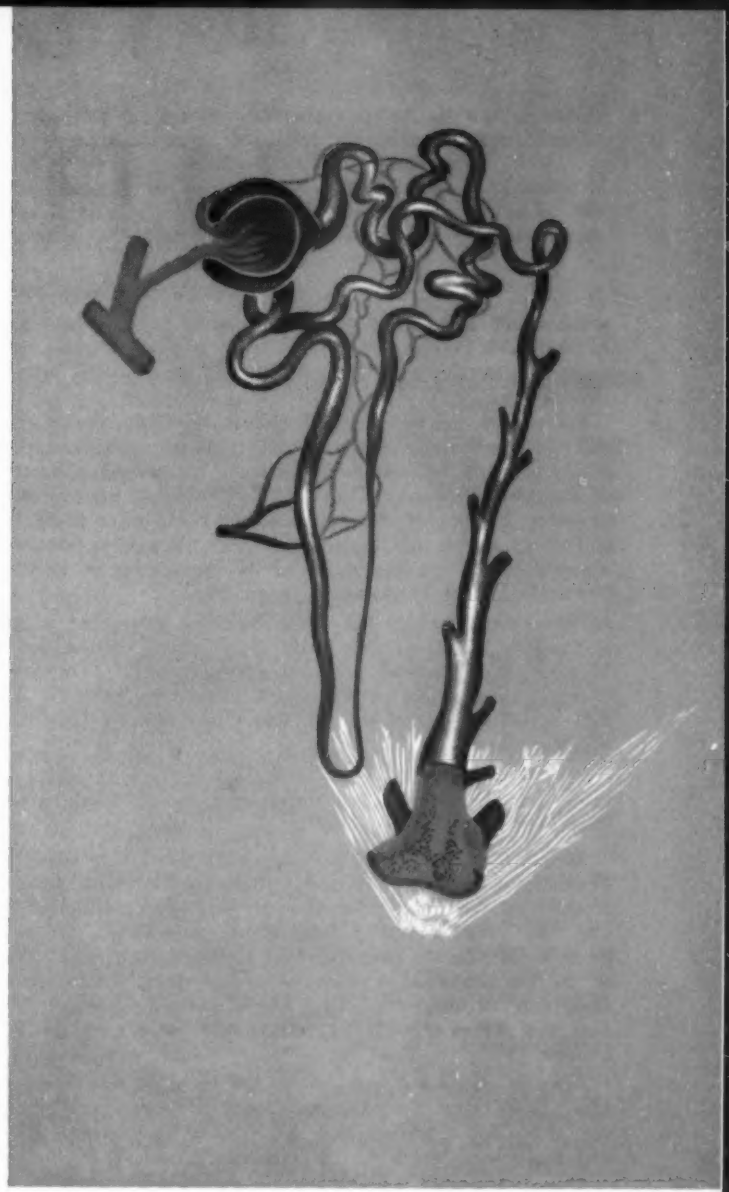

on the pathogenesis of pyelonephritis:

"An inflammatory reaction here [renal papillae] may produce sudden rapid impairment of renal function. One duct of Bellini probably drains more than 5000 nephrons. It is easy to see why a small abscess or edema in this area may occlude a portion of the papilla or the collecting ducts and may produce a functional impairment far in excess of that encountered in much larger lesions in the cortex."[1]

The "exquisite sensitivity"[2] of the medulla to infection (as compared with the cortex), highlights the importance of obstruction to the urine flow in the pathogenesis of pyelonephritis. "There is good cause to support the belief that many, perhaps most, cases of human pyelonephritis are the result of infection which reaches the kidney from the lower urinary tract."[3]

to eradicate the pathogens no matter the pathway

FURADANTIN®

brand of nitrofurantoin

High urinary concentration • Glomerular filtration plus tubular excretion • Rapid antibacterial action • Broad bactericidal spectrum • Free from resistance problems • Well tolerated—even after prolonged use • No cross resistance or cross sensitization with other drugs

Average Furadantin Adult Dosage: 100 mg. tablet q.i.d. with meals and with food or milk on retiring. *Supplied:* Tablets, 50 and 100 mg.; Oral Suspension, 25 mg. per 5 cc. tsp.

References: 1. Schreiner, G. E.: A.M.A. Arch. Int. M. **102**:32, 1958. 2. Freedman, L. R., and Beeson, P. B.: Yale J. Biol. & Med. **30**:406, 1958. 3. Rocha, H., et al.: Yale J. Biol. & Med. **30**:341, 1958.

NITROFURANS—a *unique* class of antimicrobials

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ASHP affiliates

Northern California Society

Forty-three members of the Northern California Society of Hospital Pharmacists met at the Palo-Alto Stanford Hospital Center on March 14. Following a tour of the pharmacy department, President Charles Jackson called the meeting to order. Business transacted included a report covering the placement service and announcement of plans for a breakfast meeting during the convention of the Association of Western Hospitals in San Francisco on April 26.

The guest speaker, Mr. Jack Blanshei, presented a talk along with films, on the National American Exposition in Moscow. Mr. Blanshei, a recent graduate of the University of California School of Pharmacy, was introduced by Mr. Eric Owyang, pharmacist at the University of California Medical Center.

Southern California Society

Members of the Southern California Society of Hospital Pharmacists met at Cedars of Lebanon Hospital in Los Angeles on Wednesday, February 8. The program included a film on "Neurological Effects of Phenothiazine," followed by a lecture on the therapeutic and pharmacological effects of the phenothiazine derivatives by Dr. John Bester of the University of Southern California School of Pharmacy. The film was shown through the courtesy of Merck, Sharp and Dohme.

Business transacted included introduction of two members, Mrs. Thuy Tien Van Le and David Hirscher. Plans were also made for a membership drive in the Los Angeles area and funds were voted for carrying out the work.

There was also some discussion regarding the Society's attitude toward advertising of generic name drugs.

Scholarships were awarded to two students, Jerry Schumacher and William N. Robinson, at the University of Southern California School of Pharmacy. Scholarships of $100.00 each from the Sister Junilla Memorial Scholarship Fund were presented.

Installation of President of the Northern California Society. Shown left to right are B. J. Dorton, Geigy Pharmaceuticals; Charles Jackson, president installed for the 1961 term; A. A. Mannino, Geigy Pharmaceuticals; and Past President William E. Dudley

Colorado Society

Members of the Colorado Society of Hospital Pharmacists met on February 15 at 7:30 P.M. at the Porter Hospital in Denver. President Irvin Friesen immediately turned the meeting over to Dr. H. Mehta of the University of Colorado School of Pharmacy. He discussed plans for the program for seminars scheduled in small hospitals and the role which would be covered by pharmacists. He stated that the seminars will start in April and topics to be covered in the area of pharmacy include relationship between small hospitals and pharmacists (retail, etc.), pharmacy service in small hospitals, disaster preparedness and pharmaceuticals, what nurses should know about pharmacy including the legal aspects, what pharmacy references should be stocked in hospitals, some guidelines to be used in drug purchasing, and what the physician and administration can expect from a well-qualified pharmacist.

Prior to opening the business session of the meeting, a group of student nurses from Union College presented a short program.

Indiana Society

The regular quarterly meeting of the Indiana Chapter of the American Society of Hospital Pharmacists was held in conjunction with the Indianapolis Branch of the American Pharmaceutical Association at the Rice Auditorium in the Indiana State Board of Health Building, Indianapolis, on January 28, 1961.

The seminar program was as follows:

Opening Remarks and Welcome—Fred C. Hecker, president-elect, Indianapolis Branch, American Pharmaceutical Association.

Greetings and Comments—George M. Lanigan, president, Indiana Pharmaceutical Association.

Welcome—Donald Friedmann, president, Indiana Chapter, American Society of Hospital Pharmacists.

Prescription Writing—William C. Clark, Ph.D., Department of Pharmacology, School of Medicine, Indiana University.

Promoting the Prescription Department—George Scharringhausen, president, Illinois Pharmaceutical Association.

Current Trends in Hospital Pharmacy—Clifton J. Latiolais, president, AMERICAN SOCIETY OF HOSPITAL PHARMACISTS.

Prospects of Current Trends in Cancer Research—I. S. Johnson, Ph.D., research associate, Biological Research Division, Eli Lilly and Company, Indianapolis, Indiana.

During the business session, Mr. William Wissman presented a report of the program for the Pharmacy Section of the Tri-State Hospital Assembly which is being held in Chicago on May 1, 2, and 3. The Pharmacy Section will meet on Tuesday, May 2.

Other business included appointment of a nominating committee, consideration of time preference for meetings, introduction of a new member, announcements concerning the Annual Meeting of the AMERICAN SOCIETY OF HOSPITAL

PHARMACISTS, and considerations in the possibility of including a hospital pharmacist in appointments to the State Board of Pharmacy.

In the evening a reception and banquet sponsored by the Eli Lilly and Company was held in the Main Ballroom of the Columbia Club in Indianapolis. The toastmaster was Mr. J. W. Lansdowne, president-elect, A.Ph.A., and the speaker was Dean Linwood F. Tice, Philadelphia College of Pharmacy and Science. Dean Tice spoke on "The Public Image of Pharmacy."

Greater Kansas City Society

At the January 18 meeting of the Society of Hospital Pharmacists of Greater Kansas City, representatives of the American College of Apothecaries were invited to discuss the possibility of forming a local chapter of the American Pharmaceutical Association. Following considerable discussion, a motion was made that the president of the Society of Hospital Pharmacists, the president of the local chapter of the American College of Apothecaries, and representatives from all other local pharmacy groups in the Greater Kansas City area meet together to draw up a petition to form a local A.Ph.A. chapter. The motion was seconded and approved by all present. It was further suggested that this group proceed with drawing up the Constitution and By-Laws for the A.Ph.A. chapter.

Other business transacted during the meeting included routine reports from officers and committees, a report on plans for the exhibit at the Health Fair and communications received from the national office.

Hospital Pharmacists of Greater St. Louis

Members of the Hospital Pharmacists Association of Greater St. Louis met on January 10 at St. Mary's Hospital. The meeting was called to order by President John Griffin at 8:15 P.M. Business transacted included reports from the treasurer, the program committee, and the membership committee. Other discussion covered a proposal for a social event, and a communication from *Drug Topics* regarding an incorrect statement about a bill for the repeal of an act requiring board of pharmacy examination in Missouri.

Much discussion was held regarding the action of the Hospital Council of St. Louis with regard to interest in the Formulary System. Members of the St. Louis Association were asked to be well informed regarding recent publications from the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS and total operation of the hospital formulary system. It was agreed to hold a joint meeting with representatives of the Hospital Council in order to discuss the total matter.

Included on the program was a film entitled "Control of Cross Infections in the Modern Hospital," presented by Mr. Otto Wasem through the courtesy of Winthrop Laboratories.

Nebraska Society

Members of the Nebraska Society of Hospital Pharmacists held their December meeting at St. Joseph Hospital in Omaha. Business included reading of news releases and communications, the treasurer's report, and committee appointments.

Consideration was also given to the Society's project for the year which is concerned with activities in the area of "Poison Control." The Nebraska Society is purchasing a film on poison control which will be available to members and hospitals in the area.

New Jersey Society

At the February 16 meeting of the New Jersey Society of Hospital Pharmacists, members held a discussion with the Secretary of the New Jersey Board of Pharmacy, Mr. Michael Vitale. The discussion was moderated by Mr. Henry Guerino, chief pharmacist at Clara Maass Hospital in Belleville. Questions had previously been submitted by members of the Society and covered areas such as licensing hospital pharmacies, generic equivalents, narcotic exemptions, intern hours, the possibility of a hospital pharmacist on the Board of Pharmacy, and dispensing machines.

The meeting was held at the Clara Maass Hospital in Belleville where Mr. Emil Horak, assistant administrator, welcomed the group. Other guests attending included Dr. David Reisner, chairman of the Pharmacy Committee at Morristown Memorial Hospital, Mr. Robert Boyd, administrator of Morristown Memorial Hospital, and Mr. Martin Ulan, administrator of Hackensack Hospital.

Business transacted included reading of a communication from Mrs. Florence Frick, president of the New Jersey Society, who is presently in Hawaii, a report of the membership activities by Miss Regina Richards and a discussion of plans for an institute which is to be sponsored jointly by the New Jersey Association and the New Jersey Society of Hospital Pharmacists on May 4. There was also discussion regarding expenses for a delegate to the Annual Meeting, the possibility of developing a code of ethics for hospital pharmacy, and nominations for officers for the coming year.

A Banquet followed a Joint Meeting of the Indianapolis Branch of the A.Ph.A. and the Indiana Chapter of the ASHP. Shown at the head table are (left to right) Mr. George M. Lanigan, president, Indiana Pharmaceutical Association; Mrs. George Lanigan; Mrs. Fred C. Hecker; Mr. Fred C. Hecker, president-elect, Indianapolis Branch; Mrs. J. W. Lansdowne; Dean Linwood F. Tice, Philadelphia College of Pharmacy and Science and principal speaker for the banquet; J. W. Lansdowne, president-elect, A.Ph.A.; Mr. George Scharringhausen, president, Illinois Pharmaceutical Association; Mrs. George Scharringhausen; Mr. Donald Friedmann, president, Indiana Chapter, ASHP; Mr. Clifton J. Latiolais, president, ASHP; Mrs. Irving S. Johnson; and Dr. Irving S. Johnson, Eli Lilly and Company

ASHP affiliates

Greater New York Chapter

The Greater New York Chapter of the American Society of Hospital Pharmacists met at the New York Foundling Hospital on Tuesday, February 14, at 2:30 P.M.

Miss Anna Grosso, lecturer in administrative medicine, School of Public Health, Columbia University, was the guest speaker. In her talk entitled "Hospital Pharmacy Administration," she presented a summary of lectures given to the students in hospital administration. This included material covering analysis of the definition of hospital pharmacy, laws, and policies and procedures pertinent for pharmaceutical organization and activity. While the material was not entirely new for hospital pharmacists, it was gratifying and stimulating to learn that future hospital administrators are being taught about the place of pharmacy in a hospital. Concluding, Miss Grosso emphasized that the pharmacy is "an important link in hospital administration."

During the business session, announcements were made regarding the symposium planned by the New York State Council of Hospital Pharmacists in the Fall of 1961, the tentative date for the annual field trip to the new Pfizer Laboratories in Connecticut, a report from the nominating committee, and plans to attend the Pharmacy Congress at St. John's University, Jamaica in March.

Northeastern New York Society

The Northeastern New York Society met at the Veterans Administration Hospital in Albany, on Wednesday evening, March 1. Mr. Walter Markunas, chief, pharmacy service, at the Hospital was the host for the evening.

President Joyce A. Nautel opened the meeting with a call for reports from the officers and chairmen of the Society's committees. Sister Mary Thomas, RSM, discussed the status of the treasury, and mentioned that there are only a few members who have not paid dues for the current year. Mr. Louis P. Jeffrey and Mr. Fay Peck, Jr. outlined the plans for the participation of the Northeastern New York Society in the Hospital Pharmacy Institute which will be conducted at Siena College, Loudenville, New York, in late June. Subcommittee appointments for this event were also made.

Mr. Fay Peck, Jr., and Miss Joyce A. Nautel will be the delegates to the meeting of the New York State Council of Hospital Pharmacists which will be held in Albany on March 11.

At the end of the meeting, Miss Nautel read a letter of resignation from Mrs. Janet D. McFadyne, recording secretary, who is leaving the Albany area to work in California. Miss Helene Davis was appointed to take Mrs. McFadyne's place for the remainder of the 1960-1961 Society year. Miss Nautel, the president, also submitted to the Society her resignation as she has decided to go to the west coast. The vice-president will fill out the term until the new officers are elected in June.

Oregon Society

Members of the Oregon Society of Hospital Pharmacists met at St. Vincent Hospital in Portland on February 8. During the business session Mr. Byron Smith reported on a recent open forum held by the State Board of Pharmacy to discuss the Governor's plan for reorganizing the state government—specifically as it would affect the Board of Pharmacy and pharmacy in general. He also made an announcement regarding the fact that the Portland Junior Chamber of Commerce is sponsoring a "Poison Prevention Week" and had asked for assistance from the Oregon Society. A contribution of fifteen dollars for printing literature was approved.

Dean Charles Wilson of the Oregon State College School of Pharmacy spoke briefly with regard to supporting the proposed appropriation for the School of Pharmacy by the legislature and also discussed plans for the change in curriculum at the College. Plans were outlined for scheduling a hospital pharmacy seminar next fall at Corvallis if members of the Society are interested and also work toward providing graduate studies leading to a Master's Degree in Hospital Pharmacy at Oregon State College.

The program included a talk on the educational requirements, registration and duties of medical technologists by Miss Mary Elizabeth Baptist, instructor of medical technology at the University of Oregon Medical School.

Western Pennsylvania Society

"The Function, Organization, and Operation of the Pharmacy and Therapeutics Committee," was the subject for discussion at the February 23 meeting of the Western Pennsylvania Society of Hospital Pharmacists. Participants in the panel were members of the group including J. Wolf, A. Gerlach, C. Rosco, and P. Baumgartner. The panel presented various aspects of the Pharmacy and Therapeutics Committee and cited examples covering actual experiences.

Business covered during the meeting included a report of the treasurer, a report by J. Sandala on a meeting in Harrisburg on February 15. Representatives attending included members of the Hospital Committee of the Pennsylvania Pharmaceutical Association, officers of the Pennsylvania Pharmaceutical Association, State Board members, and members of the Hospital Association of Pennsylvania. Another report was presented by Dr. John Boenigk with regard to a recent meeting concerned with setting up a poison control center. The meeting was held at Children's Hospital in Pittsburgh.

Houston Area Society

Mr. Joseph Oddis, executive secretary of the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS, was honored with a dinner by the Houston Area Society of Hospital Pharmacists on Thursday night, February 23 in the Captain's Room at the Ship Ahoy in Houston. Mr. Paul Parker of Lexington, Ky. was also a guest at the dinner.

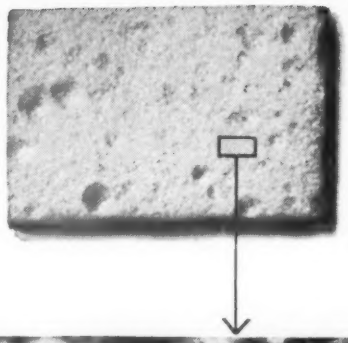
Mr. Oddis spoke informally to the group on the history, present activities, and future goals of the ASHP. He paid tribute to the many who have so generously and voluntarily helped the SOCIETY to accomplish its growth and achievements.

On the following day, the guests, along with representatives of the Houston Area Society, visited hospitals in the area and then proceeded to Austin where Mr. Oddis addressed the members of the Texas Society of Hospital Pharmacists at their annual meeting on Friday night, February 24, and appeared on the program of the 13th Annual Seminar for Hospital Pharmacists at the University of Texas on February 25 and 26. Mr. Parker also participated in the Seminar program, as well as serving as a lecturer in hospital pharmacy in the Spring Visiting Lecture Series sponsored annually by the University of Texas College of Pharmacy.

Wisconsin Society

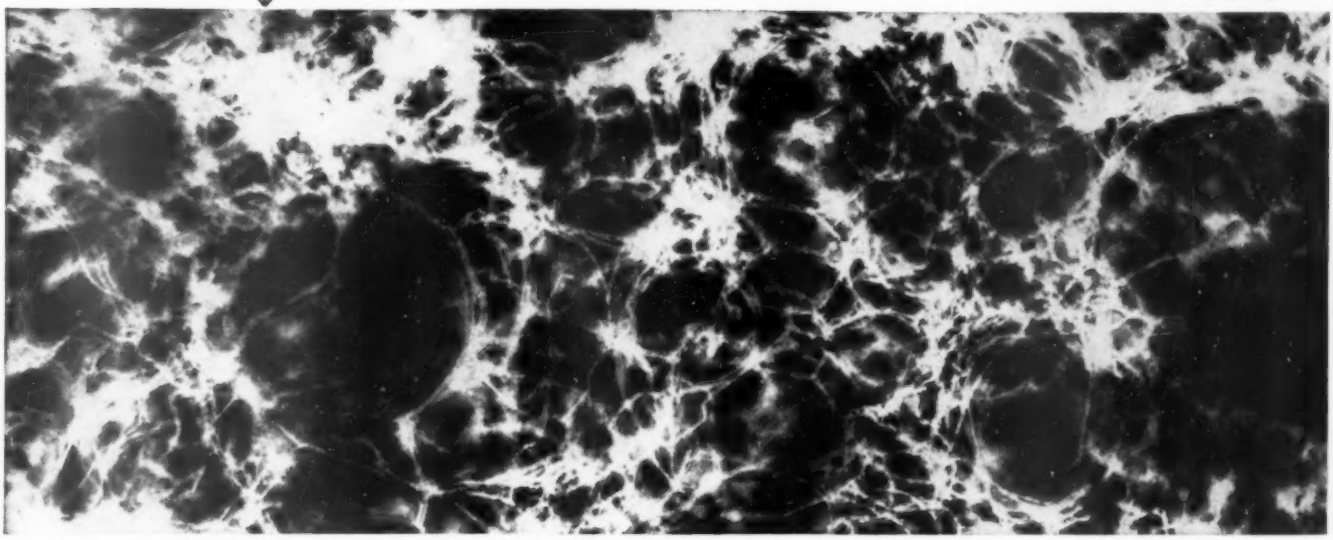
The problem of alcoholics was the subject for discussion at the February 24 meeting of the Wisconsin Society of Hospital Pharmacists. The speaker, Dr. Robert Nimz, head of the Alcoholic Clinic at St. Michael's Hospital, discussed the problem from four major aspects—medical, social, mental and spiritual. He also elaborated on the method used for treatment of alcoholic patients and presented a panel of three men who are working members with Alcoholics Anonymous.

The meeting was held at St. Michael's Hospital with Sister Mary Goretti serving as hostess. She also introduced Sister Mary Jeanne, administrator. Business transacted during the meeting included a report on progress on the manual for small hospitals without pharmacists and a discussion of the Wisconsin Society's contribution to Project HOPE.



here blood enters . . . stops . . . clots . . .

Cross section of Gelfoam (highly magnified)



Hemostasis with Gelfoam sponge is efficient and direct: blood enters . . . stops . . . clots. Later, Gelfoam is absorbed *in situ* with virtually no cellular reaction.

Hospital applications for Gelfoam are many—so varied that one or more of its uses may occasionally be overlooked.

So that your hospital can take full advantage of Gelfoam versatility, make certain you have the right Gelfoam on hand for every use. Gelfoam is supplied as sterile surgical sponge, dental pack, prostatectomy cone, biopsy sponge, sterile powder, and Gelfilm* for neurosurgery and ophthalmologic procedures.

Indications and effects: Gelfoam is an absorbable hemostatic material useful in many fields of surgery. With it, capillary oozing or bleeding from veins may be controlled instantly. When implanted in tissues, Gelfoam is completely absorbed in 4 to 6 weeks without inducing excessive scar tissue formation; when applied to bleeding skin or mucosa, it liquefies in 2 to 5 days.

Administration: Using aseptic measures, Gelfoam is cut to the desired size and applied either dry or saturated with isotonic salt solution or with thrombin solution. The prepared Gelfoam is applied to the bleeding point and held there for ten or fifteen seconds. When bleeding is controlled, the Gelfoam is left in place.

Storage and handling: Gelfoam may be stored indefinitely in the unopened package. After opening, unused portions should be discarded or resterilized by dry-air heating for four hours at 290° F. (143° C.). Sterilization by autoclaving cannot be employed.

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Precautions:
Gelfoam should be used discriminately in arterial bleeding because of the intra-arterial pressure. It is advisable to suture and reinforce where possible.
Do not rely solely on Gelfoam in patients with hemorrhagic dyscrasias.
Gelfoam will not stop menstrual bleeding—do not use post partum or for menorrhagia.
Be sure Gelfoam is in snug contact with all of the underlying or involved surfaces.
Use Gelfoam as sparingly as possible in observation of the surgical dictum regarding "as little foreign material as possible in wounds."
Do not overfill cavities.
Be sure that all air bubbles are expressed from the Gelfoam to discourage possible growth of aerobic organisms.
Do not use in grossly contaminated wounds — the Gelfoam may liquefy too rapidly.
Avoid prolonged exposure of Gelfoam to contaminated air.

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- control bleeding from small arterioles
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- secure a dry operative field
- protect brain surfaces during retraction
- carry medication
- stop epistaxis
- patch small air leaks in reinflated lungs
- reinforce suture lines
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- facilitate closure and healing of large kidney wounds
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one-fifth the weight of glass ...and infinitely safer!

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SAFEST EVERY WAY! Blow-molded of virgin polypropylene—all the corrosion resistance of glass, in the most punishment-proof bottle you've ever seen! Drop it empty: it just bounces. Drop it full: it *may* crack, *can't* shatter.

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EASIEST TO HANDLE! Weighs only 2½ pounds (versus 11 pounds for glass). And wet or dry, it never gets slippery like glass. Next time you order, specify Nalgene—and see how much easier these new solution bottles are on you . . . and on your budget. Just check with your laboratory supply dealer.

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SPECIFICALLY FOR
INFECTIONS DUE TO
"RESISTANT" STAPHYLOCOCCI

AN ENTIRELY NEW SYNTHETIC
"STAPH-CIDAL" PENICILLIN

Staphcillin™

sodium dimethoxyphenyl penicillin
FOR INJECTION

UNIQUE—BECAUSE IT
RETAINS ANTIBACTERIAL
ACTIVITY IN THE PRESENCE OF
STAPHYLOCOCCAL PENICILLINASES
WHICH INACTIVATE
OTHER PENICILLINS

Bristol™

NEW SYNTHETIC PENICILLIN FOR "RESISTANT" STAPH

MICROBIOLOGICAL AND PHARMACOLOGICAL PROPERTIES

In vitro studies show that STAPHCILLIN is a bactericidal penicillin with activity against staphylococci resistant to penicillin G. Strains of staphylococci so far tested have been sensitive to STAPHCILLIN *in vitro* at concentrations of 1-6 mcg. per ml. These levels are readily attained in the blood and tissues by administration of STAPHCILLIN at the recommended dosage. This unique attribute is probably due to the fact that STAPHCILLIN is stable in the presence of staphylococcal penicillinase. STAPHCILLIN also resists degradation by *B. cereus* penicillinase. The antimicrobial spectrum of STAPHCILLIN with regard to other microorganisms is qualitatively similar to that of penicillin G; but considerably higher concentrations of STAPHCILLIN are required for bactericidal activity than is the case with penicillin G.

STAPHCILLIN is rapidly absorbed after intramuscular injection. Peak blood levels (6-10 mcg./ml. on the average after a 1.0 Gm. dose) are attained within 1 hour; and then progressively decline to less than 1 mcg. over a 4 to 6 hour period. It is poorly absorbed from the gastrointestinal tract. STAPHCILLIN is rapidly excreted by the kidney.

As shown by animal studies, STAPHCILLIN is readily distributed in body tissues after intramuscular injection. Of the tissues studied, highest concentrations are reached in the kidney, liver, heart and lung in that order; the spleen and muscles show lower concentrations of the antibiotic. STAPHCILLIN diffuses into human pleural and prostatic fluids, but its diffusion into the spinal fluid has not yet been completely studied. However, one patient with meningitis showed a significant concentration in his spinal fluid while on STAPHCILLIN therapy.

Toxicity studies with STAPHCILLIN and penicillin G in animals show that they have approximately the same low order of toxicity.

Certain staphylococci can be made resistant to STAPHCILLIN in the laboratory, but this resistance is not related to their penicillinase production. During the clinical trials, no STAPHCILLIN-resistant strains of staphylococci were observed or developed; the possibility of the emergence of such strains in the clinical setting awaits further observation.

PRECAUTIONS

During the clinical trials, several mild skin reactions, e.g., itching, papular eruption and erythema were observed both during and after discontinuance of STAPHCILLIN therapy. Patients with histories of hay fever, asthma, urticaria and previous sensitivity to penicillin are more likely to react adversely to the penicillins. It is important that the possibility of penicillin anaphylaxis be kept in mind. Epinephrine and the usual adjuvants (antihistamines, corticosteroids) should be available for emergency treatment. Because of the resistance of STAPHCILLIN to destruction by penicillinase, parenteral *B. cereus* penicillinase may not be effective for the treatment of allergic reactions. Information with regard to cross-allergenicity between penicillin G, penicillin V, phenethicillin (Syncillin) and STAPHCILLIN is not available at present. If superinfection due to Gram-negative organisms or fungi occurs during STAPHCILLIN therapy, appropriate measures should be taken.

SUPPLY

List 79502 — 1.0 Gm. dry filled vial.

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UNIQUE SYNTHETIC "STAPH-CIDAL" PENICILLIN

OFFICIAL PACKAGE CIRCULAR
November, 1960

STAPHCILLIN™

(sodium dimethoxyphenyl penicillin)

For Injection

DESCRIPTION

STAPHCILLIN is a unique new synthetic parenteral penicillin produced by Bristol Laboratories for the specific treatment of staphylococcal infections due to resistant organisms. Its uniqueness resides in its property of resisting inactivation by staphylococcal penicillinase. It is active against strains of staphylococci which are resistant to other penicillins.

Each dry filled vial contains: 1 Gm. STAPHCILLIN (sodium dimethoxyphenyl penicillin), equivalent to 900 mg. dimethoxyphenyl penicillin activity.

INDICATIONS

STAPHCILLIN is recommended as specific therapy only in infections due to strains of staphylococci resistant to other penicillins, e.g.:

Skin and soft tissue infections: cellulitis, wound infections, carbuncles, pyoderma, furunculosis, lymphangitis and lymphadenitis.

Respiratory infections: staphylococcal lobar or bronchopneumonia, and lung abscesses combined with indicated surgical treatment.

Other infections: staphylococcal septicemia, bacteremia, acute or subacute endocarditis, acute osteomyelitis and enterocolitis.

Infections due to penicillin-sensitive staphylococci, streptococci, pneumococci and gonococci should be treated with Syncillin® or parenteral penicillin G rather than STAPHCILLIN. Treponemal infections should be treated with parenteral penicillin G.

DOSAGE AND ADMINISTRATION

STAPHCILLIN is well tolerated when given by deep intragluteal or intravenous injection.

As is the case with other antibiotics, the duration of therapy should be determined by the clinical and bacteriological response of the patient. Therapy should be continued for at least 48 hours after the patient has become afebrile, asymptomatic and cultures are negative. The usual duration has been 5-7 days.

Intramuscular route: The usual adult dose is 1 Gm. every 4 or 6 hours. Infants' and children's dosage is 25 mg. per Kg. (approximately 12 mg. per pound) every 6 hours.

Intravenous route: 1 Gm. every 6 hours using 50 ml. of sterile saline solution at the rate of 10 ml. per minute.

**Warning:* Solutions of STAPHCILLIN and kanamycin should not be mixed, as they rapidly inactivate each other. Data on the results of mixing STAPHCILLIN with other antibiotics are being accumulated.

DIRECTIONS FOR RECONSTITUTION

Add 1.5 ml. sterile distilled water or normal saline to a 1 Gm. vial and shake vigorously. Withdraw the clear, reconstituted solution (2.0 ml.) into a syringe and inject. The reconstituted solution contains 500 mg. of STAPHCILLIN per ml. Reconstituted solutions are stable for 24 hours under refrigeration.

For intravenous use, dilute the reconstituted dose in 50 ml. of sterile saline and inject at the rate of 10 ml. per minute.

*This statement supersedes that in the Official Package Circulars dated September and/or October, 1960.

(continued)

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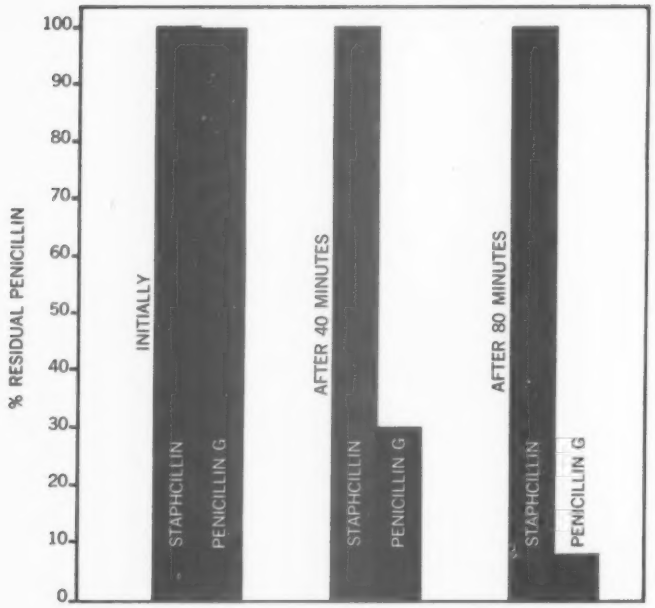
UNIQUE SYNTHETIC "STAPH-CIDAL" PENICILLIN



In the presence of staphylococcal penicillinase, STAPHCILLIN remained active and retained its antibacterial action. By contrast, penicillin G was rapidly destroyed in the same period of time. *(After Gourevitch et al., to be published)*

Specifically for "resistant" staph...

Staphcillin™

sodium dimethoxyphenyl penicillin
FOR INJECTION

The failure of staphylococcal infections to respond to penicillin therapy is attributed to the penicillin-destroying enzyme, penicillinase, produced by the invading staphylococcus.

Unlike other penicillins:

1 STAPHCILLIN is effective because it retains its antibacterial activity despite the presence of staphylococcal penicillinase.

2 The clinical effectiveness of STAPHCILLIN has been confirmed by dramatic results in a wide variety of infections due to "resistant" staphylococci, many of which were serious and life-threatening.

Like other penicillins:

STAPHCILLIN has no significant systemic toxicity. It is well tolerated locally, and pain or irritation at the injection site is comparable to that following the injection of penicillin G. *In occasional cases, typical penicillin reactions may be experienced.*

PROFESSIONAL INFORMATION SERVICE — The attached Official Package Circular provides complete information on the indications, dosage, and precautions for the use of STAPHCILLIN. If you desire additional information concerning clinical experiences with STAPHCILLIN, the Medical Department of Bristol Laboratories is at your service. You may direct your inquiries via collect telephone call to New York, PLaza 7-7061, or by mail to Medical Department, Bristol Laboratories, 630 Fifth Ave., N. Y. 20, N. Y.

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the proven anticoagulant for long-term maintenance

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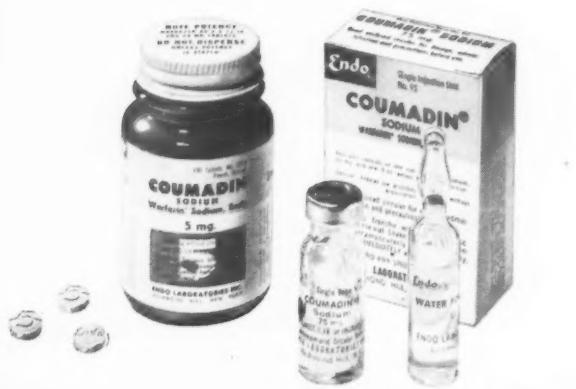

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the original and only warfarin responsible for establishing this drug as closely approaching the ideal anticoagulant.[1,2]

1. Baer, S., et al.: J.A.M.A. 167:704, June 7, 1958. 2. Moser, K. M.: Disease-a-Month, Chicago, Yr. Bk. Pub., Mar., 1960, p. 13.

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Average Dose: Initial, 40-60 mg. For elderly and/or debilitated patients, 20-30 mg. Maintenance, 5-10 mg. daily, or as indicated by prothrombin time determinations.

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HOSPITAL NOTES

a quick review to help you keep posted on atherosclerosis, cholesterol, and MER/29

91% of MER/29 PRESCRIBERS REPORT SUCCESS: Physicians are finding MER/29 effective in reducing cholesterol levels in patients with hypercholesterolemia, atherosclerotic heart disease and generalized arteriosclerosis. A recent projection estimates that 16,000 doctors prescribed MER/29 during one month alone—with 9 out of 10 obtaining satisfactory results... **BLOOD CHOLESTEROL OF SIGNIFICANT PROGNOSTIC VALUE:** According to Dr. Ancel Keys, serial blood cholesterol determinations have been underestimated as prognostic measures. Screening and epidemiological studies indicate that they may be useful in identifying potential coronary disease risks. (Keys, A., *et al.:* Proc. Soc. Exper. Biol. & Med. *104*:452, July, 1960)... **HEART ASSOCIATION TIES CORONARIES TO CHOLESTEROL:** An A.H.A. committee headed by Dr. Irvine H. Page has publicly recommended dietary changes aimed at lowering cholesterol because "reduction in blood cholesterol... may lessen the development or extension of atherosclerosis and hence the risk of heart attacks or strokes." (American Heart Association, news release, Dec. 10, 1960)... **MER/29 FAVORED OVER OTHER CHOLESTEROL-LOWERING AGENTS:** According to a two-year study in 100 patients, MER/29 seems to suffer from none of the usual disadvantages of cholesterol-lowering agents. Bile-sequestering drugs, thyroxine, nicotinic acid, proteolytic enzymes, and lipases have often proved either ineffective or toxic. MER/29 reduced cholesterol in 87% of the 100 patients without toxic effect as judged by both clinical and laboratory criteria. (Lisan, P., *et al.:* J. Lab. & Clin. Med. *56*:924, Dec., 1960.)

MER/29... the first safe cholesterol-lowering agent to inhibit the formation of excess cholesterol within the body, reducing both serum and tissue cholesterol levels.

Dosage: One 250 mg. capsule daily, before breakfast. **Supplied:** Bottles of 30 pearl gray capsules. Detailed product information and bibliography available on request.

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IN ACUTE ANGLE CLOSURE GLAUCOMA—
"dramatic response"

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Reference: Javid, M., and Davis, M.: Scientific Exhibit No. 922, A.M.A. Annual Meeting (June) 1960.

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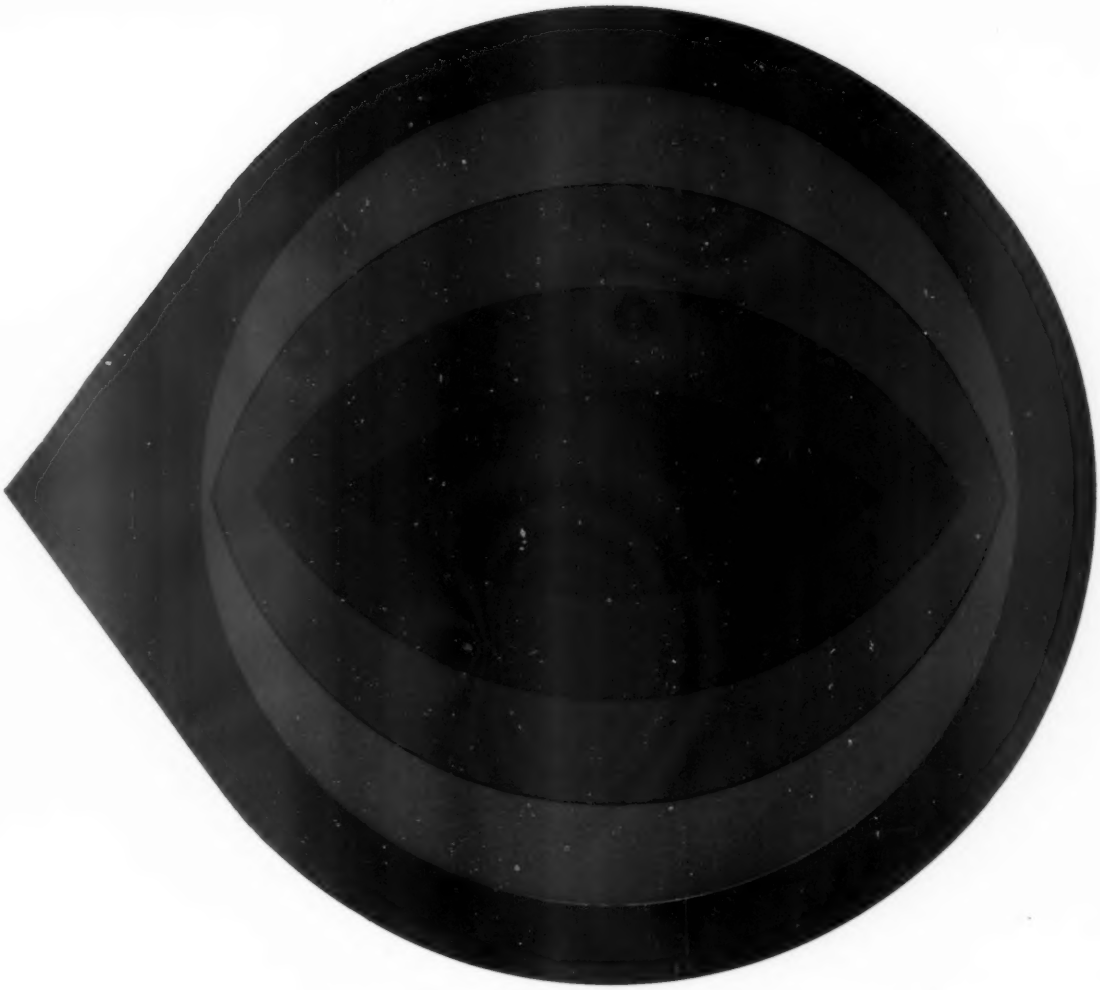

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Dosage: Intravenously, one gram urea per kilogram body weight at rate of approximately 60 drops per minute.

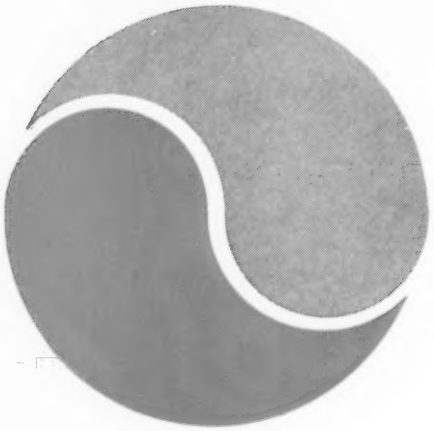
Repeated Administration: 1. Careful recording of fluid intake and urinary output. 2. Maintain a positive water balance. 3. Maintain electrolyte balance and observe B.U.N. *Note:* In all cases under general anesthesia an indwelling catheter is necessary.

Contraindications: 1. Severe renal damage. 2. Active intracranial bleeding. 3. Marked dehydration.

Caution: 1. Keep needle securely within lumen of vein to avoid extravasation. If pain at site of injection, relieve by injection of 0.5 cc. of 1% procaine through same needle. 2. Lower extremity infusion in older patients.

Side Effects: Headaches may occur in patients with normal intracranial pressure from marked lowering of intracranial pressure. Keep patient flat in bed for duration of UREVERT administration and subsequent 2-3 hours.

REFERENCES: 1. Fremont-Smith, F., and Forbes, H. S.: Arch. Neurol. & Psychiat. *18*:550 (Oct.) 1927. 2. Javid, M., and Settlage, P.: J.A.M.A. *160*:943 (March 17) 1956. 3. Javid, M.; Settlage, P., and Monfore, T.: Surgical Forum *7*:528, 1957. 4. Javid, M., and Settlage, P.: Tr. Am. Neurol. A. 1957, pp. 151-153. 5. Javid, M., and Anderson, J.: Surgical Forum *9*: 1959. 6. Javid, M.: Surg. Clin. North Am. *38*:907 (Aug.) 1958. 7. Javid, M., and Anderson, J.: J. Lab. & Clin. Med. *53*:484 (March) 1959. 8. Stubbs, J., and Pennybacker, J.: *Lancet 1*:1094, 1960. 9. Tench, J. H.; Javid, M., and Gilboe, D.: Anesthesiology *21*:117 (Jan.-Feb.) 1960. 10. Javid, M., and Davis, M.: Scientific Exhibit No. 922, A.M.A. Annual Meeting (June) 1960.



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MEMBERSHIP DUES

New Members of the SOCIETY as well as those who are delinquent will want to note the following excerpt taken from the ASHP By-Laws, Chapter V, Article 4:

"The period of membership shall coincide with the period of membership in the American Pharmaceutical Association. Dues are payable and due on the anniversary date of this period. Membership in the SOCIETY and the obligation for dues will continue from year to year unless a member's resignation, signed by the member, is received by the Secretary prior to the end of the year for which dues have been paid.

"Any member in arrears for dues shall cease to be a member of the SOCIETY, provided that at least two weeks before his name is removed from the rolls, the Secretary shall send him a written notice of his delinquency together with a copy of the By-Laws pertaining to the subject. Such a person may be reinstated as a member provided his arrears have been paid and payment of current membership dues is made."

Lehn & Fink
PROFESSIONAL DIVISION

newsletter

ELEVENTH OF A SERIES WITH SIGNIFICANT SUGGESTIONS FOR CONTROLLING CROSS INFECTIONS

EVERY day as your letters come in giving us the opportunity to help you in some area of infection control, we've been newly impressed with the increasingly evident desire for information on specific environmental control measures tailored to fit specific areas of the patient's environment. Since this environment includes the patient's complete hospital surroundings—the air around him, his clothing, the utensils he touches, the room furniture, the hospital floor, the people whom the patient contacts, and the people and instruments who contact him—practical applications for Amphyl®, O-syl®, and Lysol® disinfectants, and Tergisyl® detergent-disinfectant are many. Yet, getting the information you want to you in a form practical for evaluation by groups, such as your Committee on Infections, as well as practical for use by those responsible for carrying out control measures, is a project we've been working on for some time.

Now, we are happy to announce our new infection control kit titled, "Contamination Control That Works... in Your Hospital." We call it a kit because in a conveniently indexed file jacket you will find there is a varied collection of pertinent material. Current reprints are accompanied by completely new brochures covering the "how, where, and when" of dependable contamination control. Specific suggestions are given for general housekeeping, isolation units, O.R. and recovery, O.B. and maternity, nursery and pediatrics, emergency and outpatients, and laundry. And, of course, bacteriologic data confirming the broad spectrum activity of all L&F disinfectants is shown. (As you probably know, they are widely microbicidal, including staphylocidal, pseudomonacidal, tuberculocidal, and fungicidal.)

Your contamination control kit is ready. Please let us know where you would like to have it sent. If you would like each member of your Infections Committee to also have a kit, we will be glad to send multiple copies individually addressed.

Are you becoming alarmed over the increasing number of patients with hepatitis? Since this virus thrives in blood and feces of infected patients, instruments and utensils used on or by them, and not carefully handled or properly sterilized, are potential spreaders. Dr. Alexander D. Langmuir, chief epidemiologist of the Public Health Service's Communicable Disease Center, Atlanta, has warned that the peak incidence of 41,000 cases reported in 1960 may go as high as 60,000 this year. For the first few weeks of the year, USPHS-HEW reports already show incidence 89% above the same period last year and 189% above the same period in 1959.

L&F Instrument Germicide can be used in a practical way to fight the spread of hepatitis. Here's how—heat L&F Germicide to the boiling point, immerse instruments and hold at boiling point for 20 minutes. This destroys the viruses causing serum and infectious hepatitis, as well as bacterial spores. Boiling with plain water should not be relied upon to effect complete sterilization even if carried out for several hours. Would you like our new folder on Instrument Germicide? If so, please write us.

"If one is to control infections in a general hospital, one must control the environment of the patient." In the Journal of the Tennessee State Medical Association, December, 1960, Dr. J. L. Farringer, Jr., introduces his report on practical answers to infection control with this pertinent comment. Attention to details of general housekeeping are cited as very important in reducing the reservoirs of bacteria within the hospital. For instance—germicidal laundering of mops after each day's use, frequent changes of mop water, and use of a disinfectant-detergent are recommended. In this hospital, L&F Tergisyl was found satisfactory for these purposes as well as for the flooding and wet vacuum pickup technic for disinfecting operating room floors. Blankets were reserved for individual patients and routinely disinfected with Amphyl® during the laundry process. Would you like a reprint?

When two London physicians introduced staphylococci in varying dosages into artificial skin lesions in man, the experiments soon had to be discontinued because of septic lesions, such as boils and abscesses, developing on other parts of the subjects' bodies. (The Lancet 2:1373, December 24, 1960). It was shown that as few as fifteen seeded organisms multiplied rapidly to form a septic lesion. Also, test subjects became nasal and perineal carriers.

Have you started using Amphyl® Spray—our new spray-on spot disinfectant and space deodorant? This handy 16-oz. spray-on form of Amphyl is catching on fast. If mildew is a problem for you, you'll surely want to try it. Write us for the descriptive folder. You'll want several cans on every floor to supplement other disinfection procedures and take care of malodors at once.

If you have a particular infection control problem plaguing you, perhaps we can offer a suggestion. Our research laboratories and technical advisers are ready to help and I, personally, hope to hear from you.

Robert E. Dickens
General Sales Manager
Professional Division

LEHN & FINK PRODUCTS CORPORATION
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Dear Sirs:

Further Comment on Brand Interchange

DEAR SIRS: I particularly enjoyed two articles in the December 1960 issue of THE JOURNAL, namely "Pros and Cons of Generic Nomenclature" by Dr. Adams and "The Therapeutic Implications of Brand Interchange" by Dr. Levy.

I would like, however, to take exception to a comment made by a discussant of Dr. Levy's paper. I refer to a remark by Dr. Heller, alleging that ". . . a trade name owner may change a formulation, both inactive and active ingredients, *at his whim.*"

Dr. Heller is apparently unfamiliar with the practices observed by reputable manufacturers before making formula changes, even those confined to inactive ingredients. From several years association with the control function of a large, reputable manufacturer, I can assure Dr. Heller that no formula changes are made "at (our) whim." Any change in formula, irrespective of its nature, is made only after the effects of such change on stability and on other important characteristics of the product, including therapeutic efficacy, are checked out.

In my company, before a change in formula can be made, a formal report presenting convincing evidence that the change is worthwhile and does not alter the product's stability or efficacy must be reviewed and signed by from one to five technical experts (the number varying with the type of change) and then by one or more members of top management. This is true of *any* change, not just those which may arbitrarily be considered "significant" by one person or group.

As Dr. Heller well knows, qualitative and quantitative changes involving *active* ingredients *must* be declared on the label. This is the law. If he is referring to changes pertaining to decreased or increased *overages* of active ingredients, then on products covered by an effective New Drug Application, such changes must be approved by the F.D.A. before they can be adopted. However, it is true that increased or decreased overages of active ingredients on products not covered by F.D.A.s would not have to be declared on the label. A reduction in the overage of an expensive active ingredient may appreciably lessen the cost of the product, a fact that should be kept in mind as one reads further in this letter.

There is no question that the brand name pharmaceutical manufacturer will take the most painstaking measures to protect the quality of his product and his reputation. He *must* do so for his own best self-interest if for no other reason.

A given non-brand name product may or may not be equivalent in quality to the brand name product presumed to be of the same composition. However, the non-brand name manufacturer solicits business by shaving prices (*not* necessarily *profits!*). Unlike the brand name manufacturer, he will be more likely to make formula changes (especially those decreasing cost) *at his whim* and much less likely to carefully check out the effects of changes before making them.

Trained technical personnel, the mechanics of conducting and interpreting the results of stability and other tests, competent analytical personnel and know-how—all these cost money.

The competitive non-brand name manufacturer must be extremely cost and price conscious. Naturally, then, he will be very reluctant to incur what he may think of as avoidable added expense. Even if he recognized the dangers of adverse effects caused by what appear to be "slight" changes (and I am not at all sure such recognition by such operators is widespread), it is highly doubtful that he will spend the time and money for a thorough check out of the effects of the changes.

I believe Dr. Heller's contention, therefore, is correct except that it is misdirected. It is much more likely to be correct as it pertains to the *non-brand name* manufacturer, and therein lies the best argument I can think of for retention of and reliance on brand name pharmaceuticals.

A. E. SLESSER, Ph.D.,
Assistant Plant Technical Director

Smith Kline and French Laboratories
1500 Spring Garden Street
Philadelphia 1, Pennsylvania

arresting measure for surgical bleeding

When the customary surgical techniques for capillary hemostasis fail, prompt cessation of oozing may usually be obtained with OXYCEL (oxidized cellulose, Parke-Davis). This absorbable hemostatic conforms readily to all wound areas...assures a clear operating field...helps to shorten operative procedures.

Available in forms for every need: OXYCEL (oxidized cellulose, Parke-Davis). Pledgets (Cotton-type), 2¼ in. x 1 in. x 1 in.; Pads (Gauze-type) (8-ply), 3 in. x 3 in. and 4 in. x 12 in.; Strips (Gauze-type) (4-ply), 5 in. x ½ in., 18 in. x 2 in., 36 in. x ½ in., and 3 yd. x 2 in.; Foley cones (Gauze-type) (4-ply), 5 in. and 7 in. diameters. Sterile as supplied.

Indications: As an adjunct to effect hemostasis in bleeding associated with capillary oozing. *Use:* Strips—temporary packing of bleeding cavities, nasal passages, and tooth sockets; pads—temporary packing of surgical beds as after biopsies and to cover more or less extensive areas as in laparotomies; pledgets—in neurosurgery and in dental work for small localized bleeding areas; Foley cones—in prostatectomy.

Precaution: Excess amounts should be removed prior to surgical closure to avoid foreign-body reaction. Not to be used in sites of infection or following silver nitrate or other escharotic chemical agents. Contraindicated in clean bone surgery when poor vascularization is present and in instances where rapid callus formation is desired. Should be used sparingly in open reduction of fractures and in cancellous bone. Will not withstand heat sterilization. Remove from container aseptically.

FEB. 1961 (P-568)

PARKE-DAVIS

PARKE, DAVIS & COMPANY, Detroit 32, Michigan

absorbable hemostatic

OXYCEL®

editorial

by DON E. FRANCKE

Preparation of Sterile Solutions

► IN HOSPITALS IN WHICH STERILE SOLUTIONS are prepared, the role of the pharmacist is not, unfortunately, a dominant one. The dominant role is exercised by others in the Central Sterile Supply Department. Thus, the findings of the Audit of Pharmaceutical Service in Hospitals indicate that for every Pharmacy responsible there are (1) 1.75 Central Sterile Supply Departments responsible for the preparation of sterile bulk intravenous solutions and (2) 1.25 Central Sterile Supply Departments responsible for the preparation of sterile surgical solutions. Only in the preparation of small volume injections, such as procaine hydrochloride, etc., does the Pharmacy play the dominant role and here the ratio in favor of the Pharmacy is 3:1.

It is only in hospitals with more than 500 beds that the Pharmacy plays a dominant role in the preparation of these three categories of sterile products. But even here the ratio is only 2:1 in favor of the Pharmacy for responsibility for sterile bulk intravenous solutions, 1.5:1 for responsibility for sterile surgical solutions, and about 6:1 for responsibility for small volume injections.

In a very small percentage of cases the Pharmacy and Central Sterile Supply have joint responsibilities for the preparation of bulk intravenous solutions and small volume injections. However, in about 15 percent of hospitals preparing sterile surgical solutions the responsibility is shared by the two departments.

It should not be inferred that all hospitals which prepare certain sterile products make all they use and purchase none. On the contrary, it is safe to say that all hospitals, including those preparing solutions, purchase significant amounts of bulk intravenous fluids and of small volume injections. On the other hand, only about 1 hospital in 10 purchases sterile surgical solutions.

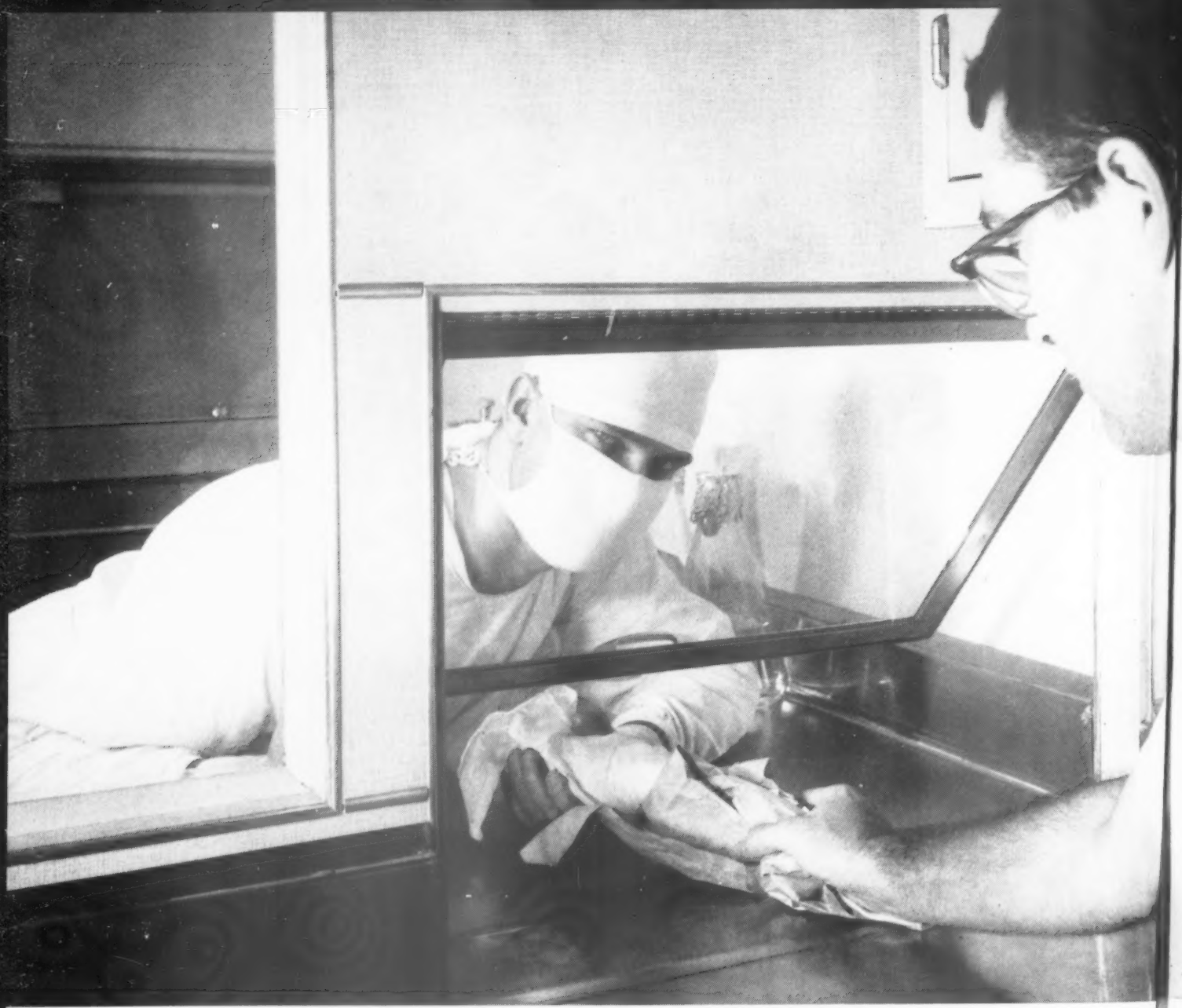
From these findings it is evident that, in those hospitals in which various types of sterile solutions are prepared, the pharmacist does not exercise his proper role, and the responsibility is assumed by non-pharmacists. This may be due to long-standing practices or traditions within the hospital or to a lack of initiative or willingness to assume responsibility on the part of the pharmacist. However, even in hospitals where the solutions are sterilized in another department there are strong legal and professional reasons for assigning the responsibility for the quality of these solutions to the pharmacist.

Considering the responsibilities of a professional group to provide service, it is evident that great challenges lie in the preparation of sterile products in the hospital pharmacy. If one considers only sterile solutions for topical use, sterile eye solutions and possibly a limited number of products for injection, it would appear that all pharmacists should be able to provide this important service.

Over 10 years ago the Division of Hospital Facilities of the U. S. Public Health Service suggested floor plans for 100 bed and 200 bed general hospitals which provided detailed plans for a parenteral solution room. In this issue of the JOURNAL, Avis, Flack, Carlin and Davis again call the attention of hospital pharmacists to this important area of professional practice.

Proper control and assay procedures should accompany the preparation of these products. Every hospital has the facilities for these procedures, if not in the Pharmacy, in another department. Performance of these controls and assays is within the professional scope and abilities of hospital pharmacists and is preferably done in the Pharmacy. The article by Salvatore Gasdia, also in this issue of the JOURNAL, is especially interesting for its discussion of the overall procedures of quality control and especially its outline of the system of records involved.

Let us hope that these fine articles will stimulate many more hospital pharmacists to accept responsibility for these pharmaceutical activities.



Pass-Thru Window in use

PLANNING A STERILE TECHNICS LABORATORY

by NEIL M. DAVIS, HERBERT L. FLACK *and* KENNETH E. AVIS

► PREPARATION OF SMALL-VOLUME STERILE PRODUCTS first started in the Pharmacy of Jefferson Medical College Hospital with the wide-spread use of penicillin in the forties. Penicillin G sodium was first available in individual 100,000 and 200,000 unit dry-filled vials.

NEIL M. DAVIS, M.Sc. is Director of Pharmacy Service, Jefferson Medical College Hospital. HERBERT L. FLACK, M.Sc. is Assistant Director, Jefferson Medical College Hospital, Assistant Professor of Hospital Pharmacy, Philadelphia College of Pharmacy and Science and Director of the Program in Hospital Pharmacy Administration offered cooperatively by the Hospital and the College. KENNETH E. AVIS, D.Sc. is Associate Professor of Pharmacy, Philadelphia College of Pharmacy and Science and Consultant in Sterile Technics to Pharmacy Service, Jefferson Medical College Hospital, Philadelphia, Pa.

Presented to the Annual Meeting of the American Association for the Advancement of Science, Section Np—Pharmacy, December 27, 1960, New York, N.Y.

The nurse on the nursing unit reconstituted the powder before use. In an effort to save nursing time, the pharmacy began to reconstitute penicillin using a buffered diluent and special precautions for storage. An area was set aside for this work. This was the beginning that led to the recognition of the need for a sterile technics laboratory.

Nursing service had been using hypodermic tablets for narcotic injections. Atropine and scopolamine hypodermic tablets had also been used extensively. Recognizing another area for professional service, one staff pharmacist was given training and, with the established area for penicillin dilution, the pharmacy was able to secure approval to delete hypodermic tablets and supply sterile injectables in their place.

Physicians and research workers learned of the pharmacy's capabilities and desire to make sterile products. They called upon the pharmacy for assistance. Sterile products and special dilutions of already marketed products were needed which were not commercially available. Soon the pharmacy was making these preparations.

The special area developed into an isolated room with a hood and an attempt at providing positive pressure and filtered air. This room became extremely useful, even though it lacked many of the features of the present area. Unfortunately, or perhaps fortunately, the area in which this room was located was needed in order to expand another section of the pharmacy. A new laboratory had to be designed.

Over the years the authors had accumulated a file of ideas for specifications for a sterile technics laboratory. The authors had also visited many pharmaceutical plants and observed the design of these facilities. They had attended meetings and exhibits of the Parenteral Drug Association and had attended other exhibits where sterile technics equipment was on display. Now came the culmination of these efforts. After months of planning and consultation with the hospital's engineering department, specifications and a floor plan were developed. A scale model was prepared to facilitate explaining to administration the desirable features of the design. Approval to proceed with construction was obtained.

Specifications

The size and shape of the area available for the Sterile Technics Laboratory materially influenced the design which is shown in the floor plan, Figure 2. Budgetary limitations also played a part in the final plans and construction. The laboratory has been functioning for over 18 months. The design and construction features have proven to be technically sound.

Specifications were prepared taking into consideration the requirements of aseptic technic and the factors which determine whether or not a finished product is free from particulate matter.

The preparation room is used to store chemicals and sterile equipment, to remove outer wrappers from sterile equipment, to weigh and mix ingredients, and to rinse used equipment. A nearby area of the pharmacy contains the source of distilled water, facilities for washing vials and bottles, clean-up area, extra equipment storage area and autoclaves. The sterile room is used to filter the solution and to fill and cap containers.

The purpose of the pass-through window is to be able to place equipment or containers in the sterile room without the necessity of opening the door. This minimizes the possibility of air from the preparation room entering the sterile room. The fact that the sterile room has greater positive pressure than the preparation room helps prevent this also. When the door to the sterile room or pass-through window is opened, air rushes out into the preparation room.

All plumbing and electrical work should be concealed by recessing the conduits in the wall. Concealing the conduits eliminates dust collecting surfaces and makes the antiseptic wash-down of the walls and floor a simple operation. Eliminating the possibilities of dust contamination in the planning stages of the area reduces environmental contamination problems, as well as reducing the reject rate of the finished product. The specifications for wall covering, floors and seamless counter tops are designed to eliminate crevices which would collect dirt and moisture.

The Quick-Connect type outlets for the gases allow for the quick insertion of valves and gauges at will. Since they are only inserted when needed, the wall has an uncluttered appearance and the number of gauges required can be reduced. It should be remembered that gauges used for other gases should not be used with oxygen because of the danger of explosion.

The hood was built into the room because it was found it could be constructed locally at a lower cost than that of a prefabricated hood. There are, however, hoods available from commercial sources, such as the Baker Company (Sterilshield), Westronic Manufacturing Company, S. Blickman, Inc., etc. It would have been desirable to have had filtered air enter from the ceiling of the hood, but because of the construction of the room this was not feasible.

The counter tops were fixed at a height of 38 inches so that the operator could work comfortably standing or seated on a high chair.

The air treatment of the sterile technics laboratory is of prime importance. The air must be clean and conditioned for the comfort of the workers. Air conditioning provides the comfort. A Cambridge Absolute Filter has been used to clean the air. This is one of the most efficient air filtering devices available. It was designed originally for the purpose of removing radioactive particles from the air of laboratories handling radiochemicals. The Cambridge Absolute Filter provides efficiencies of 99.97 percent and higher when tested with 0.3 micron particles (dioctyl phthalate test). This would include the removal of bacteria, mold, and particles of similar size. The filter media is composed of glass and asbestos. It is manufactured in several series and a wide variety of sizes to meet specific requirements for various applications.

All air filtration units should provide tight seals, firm filter supports, and a method of changing the filter without contaminating the clean air side. The Cambridge Absolute Filter is easily installed in a simple casing, requiring no connections for power, flushing water or drains. The filter requires no maintenance. A standard 1000 cfm (cubic feet per minute capacity) unit measures 24″ x 24″ x 11½″. The cost of such a unit is about $60.00. If a prefilter is installed, the life of the filter will be 8000 to 20,000 hours of operation, making it very economical to operate. A draft gauge manometer is provided in the installation to permit the personnel to know when to replace the filter.

Since there is a pressure drop across the filter, a booster fan must be installed between the air conditioner and the Cambridge Absolute Filter.

The ultraviolet lamp on the wall is placed so that it radiates on the counter-tops and floor as well as the sterile room in general. Care must be taken to insure that it is not broken. It is planned, in the near future, to place a direct radiating lamp in the ceiling of the sterile room. If the height of the ceiling had permitted, one indirect radiating unit would have been placed 7 feet above the floor so that it could remain on while an operator is in the room.

Nitrogen is one of the piped gases because it is used for inert gas filling and pressure filtration. Illuminating gas and oxygen are used for sealing ampuls. The specifications for the sterile technics laboratory elaborate some of the items mentioned.

Specifications
For Sterile Technics Laboratory*

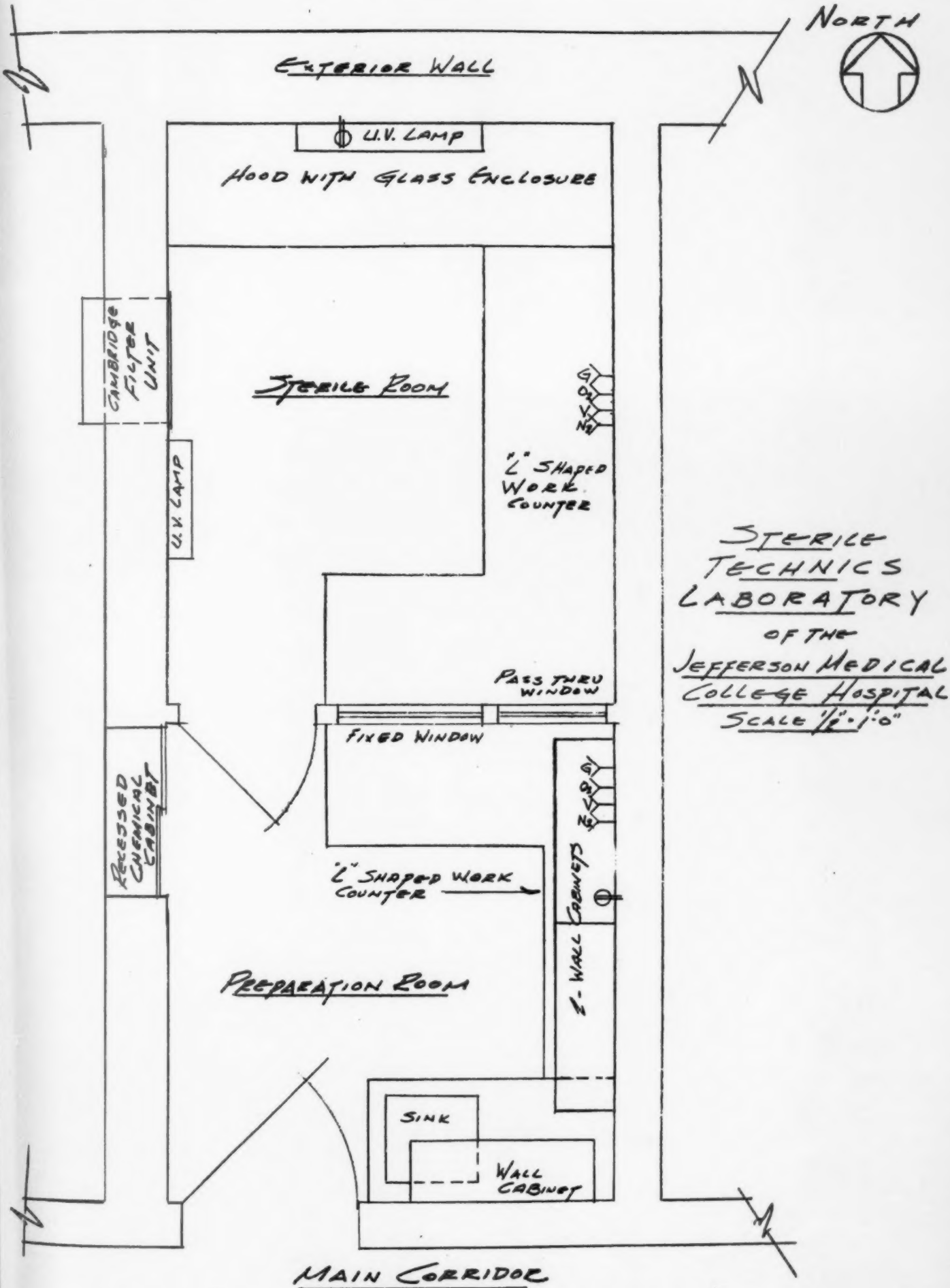
PARTITION. Construct permanent room divider with door and fixed window (window 6″ above counter top and 28″ x 28″). Divider to have pass-thru window hinged at top, flush with adjoining counters, and to open into Sterile Room (pass-through, 23″ wide, 18″ high).

WALL SURFACE. Cover walls and ceiling with impervious material which will not flake or crack and which will withstand numerous antiseptic washings. Have no exposed seams. (Material such as Formica, inlaid tile or spray on tile-like material can be used.)

FLOOR. Cover with impervious solvent and acid resistant material. Lay in sheets in lieu of blocks, with coved base.

PLUMBING. Install domestic hot and cold water piping and sanitary drainage for sink. Install nitrogen, oxygen, illuminating gas and vacuum outlets in both rooms, 9″

*Items in parenthesis are characteristic of the design at Jefferson Medical College Hospital and do not necessarily apply to other installations.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WALL CABINET
MAIN CORRIDOR
STERILE TECHNICS LABORATORY
OF THE
JEFFERSON MEDICAL COLLEGE HOSPITAL
SCALE 1/2" = 1'-0"

reparation Room and Sterile Room

above counter top. (Supplied from nitrogen and oxygen cylinders and vacuum pump in adjacent area.) Conceal piping by recessing in wall. Use Quick-Connect type outlets with dust caps.

ELECTRICAL WIRING. (1) *Light* - see lighting. Single switch in Preparation Room, convenient to door. (2) *Outlets* - locate duplex outlets (on East wall) in both rooms, 15" above counter top, and in ceiling of the hood. (3) *Ultraviolet* - see ultraviolet. Operated by separate switches with pilot light, located (on West wall) adjacent to ultraviolet lamp. (4) *Vacuum Pump Switch* - locate in Preparation Room under the surface of counter along East wall. (5) *Air Treatment* - locate thermostat and switch on (West) wall of Sterile Room.

LIGHTING. In both rooms, install ceiling mounted fluorescent fixtures, covered with smooth surface, solid plastic diffusers. Provide adequate illumination. Install similar fixture under the hood flush with ceiling.

ULTRAVIOLET. Install direct radiating unit on (West) wall, 40" from floor. Install similar unit in ceiling of hood.

COUNTER AND SINK. Install stainless steel counters with working surface 38" from floor, bracketed to walls so that brackets are as far from floor as possible. Counters to have 4" back-splash, curved and continuous with counter. All seams to be welded to make counter surface crevice-free. The counter in the Preparation Room is to have a drawer and cabinet unit beneath. Install seamless stainless steel sink with 14" deep basin and arched goose-neck faucet.

HOOD. Affixed to ceiling and walls above counter. Drop ceiling (so that it extends 17" from North wall and is 29" from counter-top). In this false ceiling, ultraviolet and fluorescent lights and electrical outlet are to be housed. The hood is to consist of three tempered plate glass windows, rimmed with stainless steel, attached to recessed portion of ceiling by means of a piano hinge. (Each window is 28" wide and 19-¾" high). The two outside windows are to rest on narrow brackets on each side wall. The center window rests on the two outside windows by means of a flange which extends from its upper outside surfaces. The windows are supported at a 70 degree angle.

CABINETS. Wall mounted, baked enamel metal cabinets (located as shown), 21" above counter. Recessed chemical storage cabinet with sliding doors, (located as shown).

AIR TREATMENT. To consist of air conditioning system, booster fan and Cambridge Absolute Filter, connected in series.

(1) *Air Conditioning* - adequate to maintain 75° F. temperature. To circulate 20 percent fresh air and 80 percent recirculated air. Treated air to enter Sterile Room, and then pass to Preparation Room through counter-balanced louver, located in room divider. Intake duct in Preparation Room to carry air back to air treatment unit to be recirculated. Positive air pressure must be maintained in both rooms, with Sterile Room having greater pressure than the Preparation Room.

(2) *Booster Fan* - adequate in capacity to overcome the pressure drop which the conditioned air will encounter when passing through the Cambridge Absolute Filter.

(3) *Cambridge Absolute Filter* - adequate in size to handle the cubic feet per minute (cfm) change of air required for both rooms. Install manometer to measure pressure drop across filter.

Testing

Quantitative assays as well as sterility tests are performed on each preparation made in the sterile technics laboratory. All sterility tests to date have been negative. Preparations are made using terminal sterilization where possible, however, in many cases only aseptic technic can be used.

TABLE 1. Plate Count in Sterile Technics Laboratory

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
Count A	2	2	1	1	0	1	1	1	0	0	0	20
Count B	4	3	7	2	0	0	1	0	1	0	0	75
Count C	1	2	3	0	0	0	0	0	0	2	0	10
Count D	12	4	22	0	0	0	0	0	2	0	1	18
Count E	7	20	24	3	2	3	1	4	1	0	0	37
Count F	3	2	5	5	5	1	1	2	0	0	0	23
Count G	5	3	2	0	0	1	1	1	1	0	0	18
Count H	1	1	4	3	1	3	2	2	1	0	0	13
Count I	1	0	3	0	0	0	0	0	2	0	0	3
Count J	4	1	4	4	1	2	0	1	0	0	0	12
Count K	17	10	13	1	3	2	0	0	3	2	0	16
Count L	5	0	3	2	1	1	5	2	1	0	0	12
Count M	13	9	4	1	0	1	0	1	0	0	1	13
Average	6	4	7	1.7	0.8	1.1	0.9	1.1	0.9	0.3	0.2	20

Location 1 - sink drain board; Location 2 - Preparation Room, counter-top East wall; Location 3 - Preparation Room, counter-top North wall; Location 4 - Sterile Room, counter-top South wall; Location 5 - Sterile Room, counter-top near pass-through; Location 6 - Sterile Room, counter-top East wall; Location 7 - Sterile Room, counter-top under hood East side; Location 8 - Sterile Room, counter-top under hood Center; Location 9 - Sterile Room, counter-top under hood West side; Location 10 - Sterile Room, taped to air supply vent, open side in path of incoming treated air; Location 11 - Control; Location 12 - Exposed to direct cough of operator.

To test the environmental control of the sterile technics laboratory, colony counts are taken periodically. Sterile trypticase soy agar plates are exposed for 20 minutes in ten areas of the laboratory. The plates are exposed while the operator is preparing sterile solutions or filling and capping containers. The laboratory is previously cleaned with an antiseptic solution.

The plates are incubated for 48 hours at 32° centigrade. The results are shown in Table 1. The number of colonies varied with the location of the plates, with the care taken in preparing the room, with the number of operators in the area of the plate during the procedure, with the number of units prepared and with other factors. However, the results obtained give evidence that adequate environmental control has been achieved, particularly in the sterile room where control is most important.

Conclusion

A sterile technics laboratory is needed in a hospital pharmacy to prepare injectables, to make special dilutions of injectables which are not commercially available, and for the preparation of ophthalmic solutions. The authors have presented specifications for a sterile technics laboratory which fulfills this need in their hospital. This type laboratory, coupled with specially trained personnel, exacting sterile technics and a rigid control program are four essentials necessary to provide complete professional service in a modern hospital.

PREPARATION OF INJECTABLES --philosophy and master procedures

by KENNETH E. AVIS, HERBERT S. CARLIN *and* HERBERT L. FLACK

► HOSPITAL PHARMACISTS HAVE A UNIQUE POSITION among pharmacists for showing members of the medical and nursing professions the professional services that they are prepared to provide the patient, to the mutual advantage of the physician, nurse and pharmacist. The impressions made by hospital pharmacists upon student physicians and student nurses, also, can be of immeasurable value for the years ahead. Therefore, hospital pharmacists should be motivated, and most of you are so motivated or you would not be here at this meeting, to carefully and frequently reevaluate not only what you do but why you do it. The reasons behind a certain action often show more clearly than the action itself, as you well know.

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In the area of manufacturing, and particularly in the area of manufacturing of injectables, the hospital pharmacist has a real challenge to provide a service to the medical staff, for the ultimate benefit of the patient.

This service may take the form of providing preparations which are not available commercially, or at least not available commercially at a quality level in which you could have confidence. The medical staff might desire preparations at a concentration not commercially available. There is also the service of providing preparations for special needs or for research studies being conducted by members of the medical staff. Mention should also be made of the service of providing a preparation at a cost lower than that available from commercial sources.

Importance of Cost Factor

The cost factor in the manufacture of injectables should always be considered with studied care. No hospital pharmacist can neglect the cost factor in his operation. It is reasonable to assume that he can manufacture an injectable preparation at a lower cost than a commercial supplier can provide the same product. The hospital pharmacist has the advantage of no advertising and distribution costs and considerably lower packaging costs. However, the relatively fixed testing costs and frequently less efficient operation with usually smaller production lots, may eliminate the initial, apparent, economic advantage to the hospital pharmacist. This is not to say that injectable preparations cannot be made in the hospital with a substantial saving to the hospital and to the patient, but an adequate

preparation, production and testing program for injectables is a costly program. Should it be that a hospital pharmacist thinks primarily of the cost factor in planning the manufacture of injectables, the welfare of the patient is dangerously at issue. Such a philosophy leads invariably to "cutting corners," to finding ways to reduce the cost of preparing the product. Injectables, more than any other type of pharmaceutical product, require a reliability and quality that is above doubt. No philosophy resulting in the elimination of vital steps in the preparation, production or testing program, for any so-called "reason," can do other than reduce the reliability and quality so necessarily an integral part of injectable preparations.

Therefore, the hospital pharmacist who is embarking upon a program for the manufacture of injectable products should so plan his program that the integrity of each finished container of product can be viewed with confidence, that it can meet the final test of confidence relative to personal administration. And, although a consciousness of cost should and must be maintained, it should not hold preeminence.

At the Jefferson Medical College Hospital Pharmacy we have sought to develop procedures which embody this philosophy. We have sought to abide by principle without ignoring practical aspects. Admittedly, some of the procedures could be improved were additional facilities available. But, how rarely does the practical possibility wholly conform to the ideal! Nevertheless, the procedures delineated here can be expected to provide the measure of confidence in the safety and quality of an injectable product so necessary to such a product.

Personnel and Facilities

Any program for the preparation of injectable products, no matter how well conceived and pre-evaluated, is dependent upon properly qualified personnel for the attainment of its objectives. This involves not only adequate training in the specialized techniques required in the manufacture of injectables, normally more than that available in the usual undergraduate curriculum in pharmacy, but an understanding of and an intent to adhere to the concepts behind those techniques. A pharmacist has the background required upon which to build the specialized techniques necessary for the proper manufacture of sterile products, but additional training to provide familiarity with these specialized techniques and the reasons for their necessity is usually required. In addition, the pharmacist who is to be successful in the manufacture of injectables must be one who has or will develop a consciousness for details, a rigorous standard of cleanliness, and an inflexible rule of orderliness. It is obvious that thorough cleanliness is necessary for the proper manufacture of an injectable, but it may not be so obvious that a procedural detail ignored or a mismarked or misplaced piece of equipment could make the difference between a satisfactory and an unsatisfactory product.

It is not mandatory that the trained pharmacist personally carry out all of the procedures in the manufacturing process, but he must be prepared to provide adequate training and supervision down to minute details, if lay persons are entrusted with certain aspects of the procedure. Taking knowledge of the tendency of human beings to be careless or willfully negligent, this entails close personal supervision or carefully planned checks to keep the personnel vigilant.

The facilities for manufacturing must also be adequate. Particularly, they must be designed so that they can be thoroughly cleaned and the manufacturing environment can be controlled with respect to contamination. The walls, floors, counters and other facilities must be constructed of material that is impervious to moisture and is free, as near as possible, from crevices where debris and moisture may accumulate. Adequately filtered air must be admitted to the room more rapidly than it can escape so that clean air will flow out, rather than unfiltered air in, through any opening from the room. Properly located ultraviolet lights also aid greatly in maintaining control of contamination in the room where injectables are manufactured. Of course, the best facilities are ineffective without adequate housekeeping, including an antiseptic wipedown of the entire room, at least as frequently as prior to each manufacturing procedure.

A valuable index of the control maintained over contamination of the room may be obtained by exposing culture plates containing nutrient agar for a designated period, say 20 minutes, and then incubating the plates. The number of colonies that grow on the plates is indicative of the microorganisms that fell from the environment on the plates during exposure. A well-controlled room should show an average of less than one colony per plate, exposed while the room is empty and before the manufacturing procedure has begun. Of course, with personnel working in the room the count will rise but should still show an average of less than five colonies per plate.

Master Procedure Manual

The Master Procedure Manual* is designed to provide all the details necessary for the preparation of a satisfactory product. It provides a source for instruction of new personnel. It serves as a guide for routine production. But, most important, it serves as a standard against which every procedure must be compared. Once an adequate procedure has been developed and delineated, an inflexible rule should be established that no change may be made in the pro-

*See page 229 for Procedure Manual.

cedure without the approval of the Director of Pharmacy Service or, preferably, a product development committee. This also includes the formula. No individual should have the right to make a unilateral change in the formula or procedure. In addition, the original copies of the Manual should be kept securely stored and accessible to only certain designated members of the professional staff. Reproduced copies should be used for each lot of product with provision for recording of the initials of those who performed each step and for those who checked each measurement.

Small Volume Production of a Product

The Formula

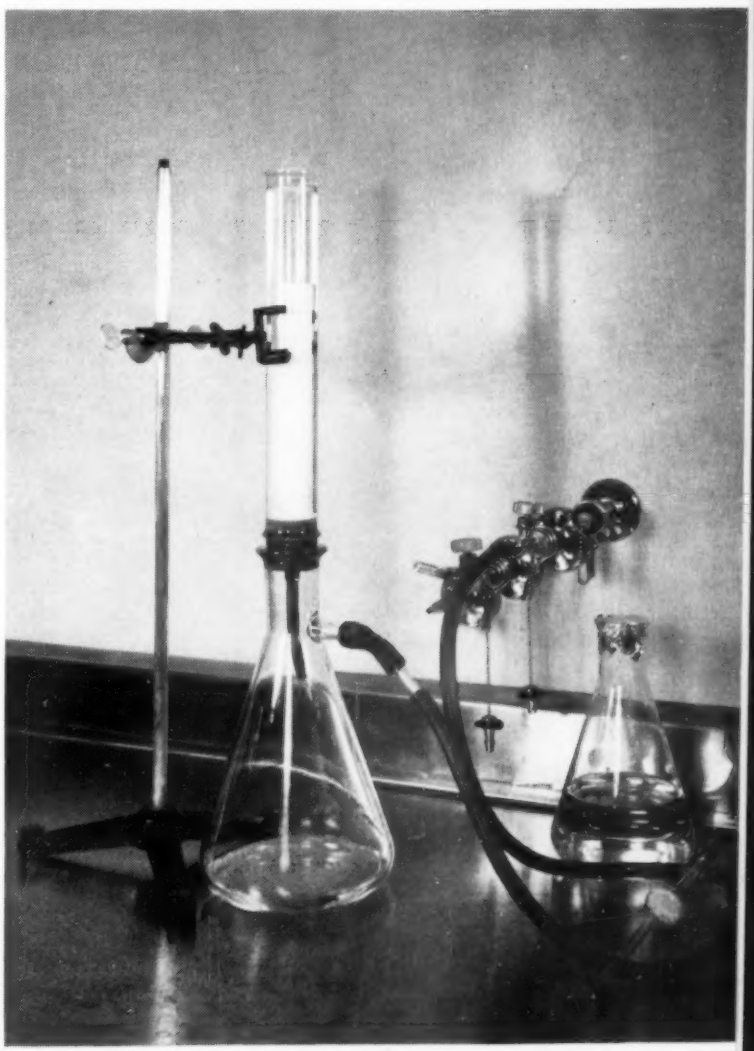
The formula is of initial concern. A pharmacist is responsible for the product he manufactures. The publication of a formula in current literature is no guarantee that it will provide a satisfactory product under your conditions of manufacture. It may, however, give you a good start toward developing one. The Atropine Sulfate Injection formula that we have selected as an example of the formulary and procedure used at Jefferson Medical College Hospital has proven to be satisfactory in our situation, but, should you be inclined to use it, do not depend upon it being satisfactory under your conditions of manufacture until you have proven it to be so. The age and quality of chemicals may vary, the quality of water may vary, cleaning techniques of equipment and containers may not be exactly the same, and other techniques may vary enough so that the product is not prepared exactly the same in two different institutions. Consequently, the burden of proof for the quality of the product must rest with the manufacturer of the specific product.

The content of active ingredients in our Master Formulas has been given in terms of 100 percent strength. It is intended that the Working Formula will be adjusted to compensate for variations in the assay of different lots of the chemical and for procedural losses, such as hydrolysis and removal by filters. It has been found that an additional 5 percent must be included in our Atropine Sulfate Injection Working Formula in order to ensure a product of full strength.

The quality of water used in the manufacture of injectables can be a significant factor in the preparation of a stable product. Ionic contamination may catalyze reactions or vary the *p*H in the product. Therefore, it is essential to establish conductivity standards for Water for Injection. A conductivity of 2 micromhos (approx. 0.5 p.p.m. NaCl) or lower would be essential.

The order of mixing ingredients may also be significant. If an antoxidant is necessary to protect a medicinal ingredient, the antoxidant should be added prior to the medicinal. Addition of buffers and preliminary

Vacuum filtration assembly using filter candles



adjustments of *p*H may have to be made early in the mixing procedure.

In most formulas, the proportion of the active ingredients is expressed in relation to a given volume of the preparation. However, in the manufacturing process, the volume of the preparation is appreciably affected by the temperature. Since Water for Injection is often stored or prepared at an elevated temperature, and since the temperature will vary at the time the product is completed depending upon environmental conditions, it is desirable to make a product up to a predetermined weight. Variations in temperature from lot to lot do not, then, affect the finished product. This procedure is, of course, limited to lot sizes that can be conveniently handled by weighing them.

Equipment

The equipment check list is a means of making certain that no needed piece of equipment has been forgotten. It is obvious that equipment must be thoroughly cleaned and sterilized before it is to be used. This requires careful planning, since the omission of one item of equipment may mean that the preparation cannot be made the day that it was scheduled. It is a good policy to prepare duplicate items of equipment, wherever possible, so that the inadvertent contamination of one item of equipment will not stop the manufacturing process.

Equipment should be rinsed with Water for Injection as a final cleaning step, preferably inverted so that there will be thorough flushing out of all residues of previous treatments. Towels or other lint producing materials should not be used around the rinsed containers. Step 1 describes the rinsing procedure to be used for the stock bottles just prior to their use in the preparation of the product. (See Procedure Manual, Atropine Sulfate Injection.)

Filtration

When a solution is filtered through a filter candle, as in Step 5, it should always be remembered that the filter surfaces come in intimate contact with the solution passing through it, in some cases the liquid would be essentially in mono-molecular layers. Therefore, a filter can affect the solution, particularly if it is dirty from previous use. The importance of the cleaning and preparation for reuse of a filter cannot be overemphasized.

Several procedures are described in the Procedure Manual for the preparation of Selas filter candles and one procedure for the Ertel asbestos filter. Since candles are reused they must be cleaned with particular care. If the solutions used with certain candles are electrolyte solutions of highly soluble salts, thorough rinsing with Water for Injection will probably be adequate as a cleaning procedure. Process C would be used in such cases.

The most frequently used procedure will be one such as described as Process A. For solutions of organic and inorganic substances that are relatively soluble in water or that can be rendered soluble by hydrochloric acid, this process could be used. The initial reverse flushing with water serves to dislodge gross particulate matter from the surface and upper pore areas of the filter. Thorough rinsing with distilled water also removes most of the soluble contaminants from the pores of the filter. Soaking the candles in hydrochloric acid, and filtering acid through the pores aids in solubilizing some of the potential contaminants and also increases the positive charge on the surfaces of the candle. The acid must be thoroughly flushed from the candle with distilled water. A simple check on the completion of this flushing process is accomplished by determining the conductivity of the effluent. When its conductivity is again as low as the starting distilled water, the candle has been flushed free from residual acid and other ionic contaminants. Finally, the candle should be rinsed with Water for Injection to minimize the risk of pyrogen contamination.

It is not mandatory to perform the bubble pressure test on filter candles each time they are used for clarification, but the test is essential each time the candles are to be used for a sterilizing procedure. In addition to providing an evaluation of the pore size of filter candles, the bubble pressure test gives some indication of the filtering condition of the candle. If a crack develops, the bubble pressure test will show a line of bubbles at an abnormally low pressure. If materials such as an oil or a detergent residue is present in the candle, abnormally low bubbling will occur, probably in spots on the candle. Abnormally high bubbling pressure indicates that the candle is plugged with debris and needs more rigorous cleaning.

When candles give evidence of being plugged or heavily contaminated, either by showing an abnormally high bubble pressure test or by showing a reduction in flow rate, ignition cleaning is usually needed, as described in Process B. Igniting a candle (it must be dry) burns off organic matter as carbon dioxide, and most inorganic materials are volatilized or converted to oxides. Treatment with hydrochloric acid prior to ignition helps to solubilize some contaminants. It may also be desirable to include an acid treatment after ignition to solubilize some of the oxides remaining as a residue in the candle. In any case, thorough flushing with distilled water and Water for Injection is essential. A bubble pressure test must also be performed after ignition cleaning.

Process E, for the Ertel asbestos filter, is designed to effectively clean the pores of the filter stone for reuse and to flush from the new asbestos pads as much as possible of the soluble or otherwise available metallic

ions and alkalinizing constituents from the pads. In some cases it might also be necessary to flush the pads with a dilute hydrochloric acid solution.

In carrying out the filtration process, it should be borne in mind that lint, dust and other particulate matter may enter a filtrate although the filter is functioning properly. Lint in the receiver or introduced from the air, for example, may be sources of such contamination. The only solution to this problem is refiltration until the filtrate is clean.

Filling

After the solution is filtered it must be protected from contamination. All containers and equipment coming in contact with the filtrate must be free from contamination. In addition, exposure of the solution to the atmosphere must be kept to a minimum. Thus, the final containers (vials) should be uncovered only sufficiently long to introduce the solution, and then be stoppered with rubber closures. This requires careful planning, efficient operation and, usually, the coordinated efforts of at least two persons. Minimal contamination during the filling operation also requires good control of the environmental conditions. Personnel must also be properly attired with full covering, freshly laundered (preferably sterile), lintless gowns, face masks and caps. They must also be conscious of improper procedures that may increase the risk of contamination, such as movement over open vials during the process of filling.

The filling operation is one of the most critical steps, if not the most critical, of the entire manufacturing process. Its critical nature is further increased when filtration is used for the sterilization of the solution. In such cases there must be a complete elimination of contamination during the filling process.

Containers

The glass containers used for injectable aqueous solutions should be made of Type I (borosilicate) glass. Such glass is highly resistant to chemical attack and will not produce incompatibility with most solutions, even when subjected to the process of autoclaving. Greater chemical resistance can be obtained from Type I (borosilicate) containers that have been treated with sulfur dioxide. Such treatment also increases the resistance of soda-lime glass containers to chemical attack. However, since it is only a surface treatment, repeated autoclavings, repeated detergent washings, and reactive solutions may expose the underlying soda-lime glass. Consequently, such containers (Type II glass) are suitable for use with only a few aqueous solutions and are rarely suitable for reuse with injectable solutions. If containers are to be reused, they must be made of Type I glass.

The cleanliness of containers for injectable solutions must meet high standards. Even processes such as described under Process J, K, or L may be entirely inadequate if the rinsing device is not kept scrupulously clean, if the device contributes iron or other metallic contamination to the containers, if the steam or water rinses are not clean, or if the containers are inadequately protected between the time of rinsing and of filling. All containers should, preferably, be sterilized in a hot air oven at a temperature of 170° C. for 4 hours. If facilities cannot be obtained for this, less desirable methods must be employed. Reused containers, particularly, need to be hot air sterilized because of the increased danger of pyrogen contamination.

Closures

Closures for parenteral solutions are made of compounded rubber. Several ingredients are included in the formulation in addition to natural or synthetic rubbers. Many of these ingredients are chemically reactive if they migrate into the solution in contact with them. Consequently, rubber closures must be selected with care. The best procedure currently available for evaluating the compatibility of a rubber closure formulation with a particular product is to place samples of the closures in flasks containing some of the solution. The flasks and contents should then be autoclaved and/or stored at several temperatures to determine whether or not they are compatible.

Some added substances are removed from aqueous solutions by rubber closures under prolonged contact. Sometimes this problem can be minimized by equilibrating the rubber closure with a solution of the added substance prior to use, making use of the accelerating effect of autoclaving.

Rubber closures must be thoroughly cleaned by effective agitation in hot detergent solution followed by effective flushing away of loosened debris. Cleaning and leaching of available chemical constituents can be facilitated by several autoclavings. Such treatment may render a closure compatible with a particular product when it would not otherwise be so.

Clean, sterile rubber closures must be inserted in the neck of vials in a manner which will prevent contamination. Probably the most rapid manual method involves inserting the closures by hand, with the hands covered with sterile rubber gloves.

It is preferable to use lacquered aluminum caps for products that are to be autoclaved in order to eliminate the unsightly water-marking that occurs with nonlacquered aluminum caps, as indicated in Step 9.

Sterilization

Whenever possible, injectable products should be sterilized by autoclaving in the final container. This provides the greatest measure of assurance of the

sterility of the product. However, it should be remembered that even autoclaving can be ineffective if not conducted properly or if there is a mechanical failure. Therefore, it is essential to have supplementary sterilizing controls for each autoclave cycle, preferable thermocouples.

It should also be borne in mind that the heat of autoclaving greatly accelerates chemical reactions. Thus, it may be necessary to prepare some injectable products by the process of sterile filtration in order to avoid the heat of the autoclaving cycle.

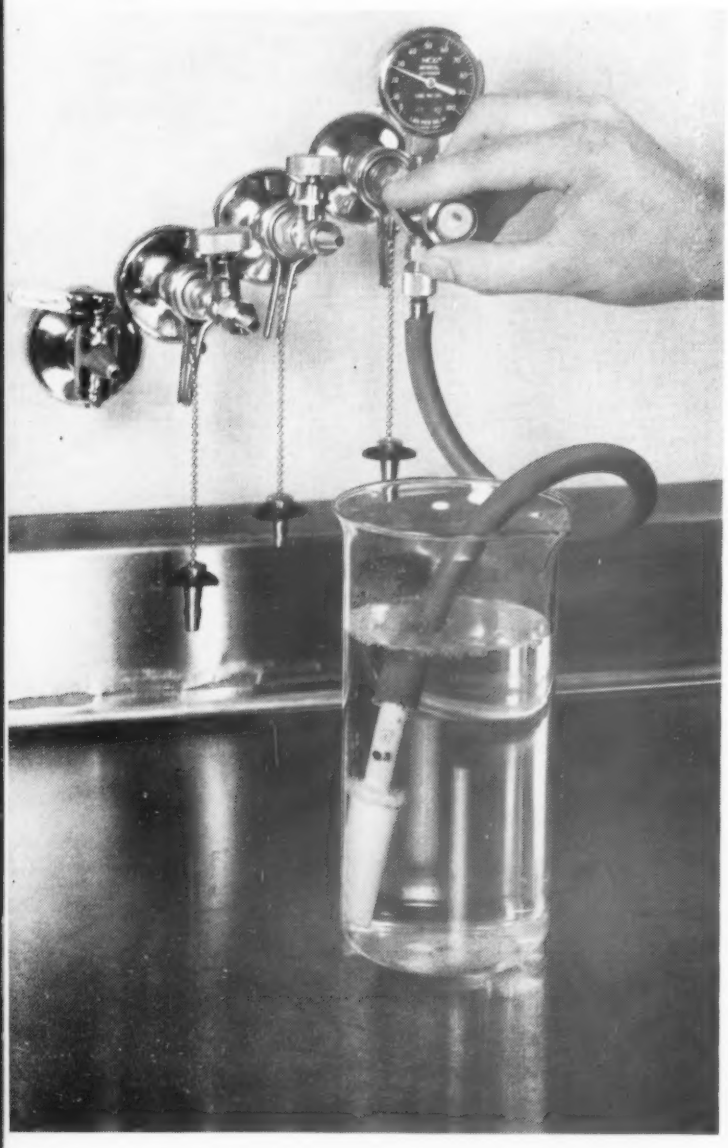
Testing

The testing program delineated in Steps 11, 12 and 13 is considered to be minimal. The Water for Injection should have previously been tested for pyrogen. It should also have been tested for ionic content by a conductivity measurement. The official sterility test must be performed on the finished product, using ten units. While the tests are being performed the product is held in quarantine. A quantitative assay is performed, using the contents of the same vials from which samples for the sterility test were removed. The assay should be performed in duplicate.

The clarity test should be performed at the end of the quarantine period. This provides a period of time in which undesired changes in the product may develop and thus be detected when clarity inspected, before the product is placed in stock. Naturally, the formulation of the product and control of the manufacturing process are designed to eliminate the possibility of an unsatisfactory product. However, unexpected reactions or effects may occur. The level of discrimination for particulate matter should be established such that products which would appear to be unclean and of substandard quality would not be issued for use. This requires not only training and careful observation by the person performing the test but frequent checks by others to be sure that a proper level of discrimination is being maintained.

At the time of clarity inspection, the product should also be carefully examined for irregularity of fill, mislabeling and other abnormalities.

Bubble pressure testing of filter candles



Labeling and Records

Information contained on the label must be adequate. This must include an identifying lot number that is capable of revealing the complete history of a particular vial. In order for this to be possible, adequate and available records must be maintained. Records should be kept at least as long as any of the product remains in the hospital.

Large Volume Production of a Product

The principles involved in the preparation of a product in large volume are no different than those

already discussed in relation to the preparation of a product in small volume. However, certain modifications in the practical approach must be made because of the larger volumes involved.

First, equipment is larger. This requires modifications in cleaning techniques, handling and protection of the product from environmental contamination. It is imperative that large solution tanks be kept clean. Immediately after use they should be scrubbed and rinsed thoroughly, giving special attention to pipe connections and the pump head. Prior to use the tank should be rinsed thoroughly with hot Water for Injection and with steam. This includes the pipe connections and the pump head. Steam is an effective cleaning agent and should be used liberally. Following treatment with steam there should be another thorough rinse with hot Water for Injection.

Normally, the principal problem in preparing a large volume of solution is the mixing. The mixing device must provide rapid and thorough mixing. Ingredients should be added slowly enough so that they dissolve or disperse uniformly and quickly to make a homogeneous solution. Making the formula up to the finished volume requires careful attention to the reading of the liquid level and a consideration of the effect of the temperature of the solution on the volume. Although it is evident that there may be a variation of many milliliters in measuring the finished volume of a liquid in a tank, with proper, careful pharmaceutical technique the percentage error should be 1 percent or less.

Filtration is accomplished in Step 4 by pumping the solution through the filter. It should be remembered that the pump is forcing the liquid against a resistance. If the resistance is too great, the pump may be damaged. Thus, the fineness of the pore size is limited. The solution should be recirculated through the filter until it is clean.

The remainder of the process illustrated by the Isotonic Sodium Chloride Injection is not different from those steps discussed previously for Atropine Sulfate Injection.

Conclusions

In presenting the philosophy and the procedures involved in the manufacture of a 4000 ml. volume of Atropine Sulfate Injection and a 50,000 ml. volume of Isotonic Sodium Chloride Injection as practiced at the Jefferson Medical College Hospital Pharmacy, we have sought to show an ideal procedure modified by practical considerations to the extent that it is functional. However, the practical considerations have not modified the ideal beyond the point of which the pharmacist, as well as the physician, nurse and patient, can have full confidence in the quality and reliability of the injectable product.

JEFFERSON MEDICAL COLLEGE HOSPITAL
PHARMACY SERVICE

PROCEDURE MANUAL FOR PARENTERAL AND OTHER STERILE PREPARATIONS

I. General Notices

OBJECTIVES. The objective of this Procedure Manual is to provide the procedures and formulas required to prepare accurate, stable and safe parenteral and other sterile products. Obviously, such an objective is dependent for its accomplishment upon properly qualified personnel. In addition to adequate professional and technical background, such personnel must be meticulous with regard to cleanliness, undeviating with regard to required procedures, and critically observant of each step for flaws in the procedure or for improvements, that the objective might be attained.

PRODUCT DEVELOPMENT COMMITTEE. No change may be made in the formulas or procedures entered herein without the consultation and agreement of the Product Development Committee. This Committee is composed of the Director of Pharmacy Service, Chief of Education and Research Division, Chief of Control and Special Projects Division, and the Chief of Manufacturing Division. The Chief of Manufacturing Division is Secretary of this Committee.

CONTROL. Repetitive accomplishment of the objective is largely dependent upon adequate control of the procedure. In-process control involves double checking the identity of all ingredients, their weighings and measurement, and a strict adherence to the formula and procedure given. Tests and assays as specified must be performed on all final products as a part of the control process. Since identity tests will not be performed for inadvertent contaminants of the product, in-process control must be designed to eliminate the possibility of accidental, potentially dangerous, contamination.

QUANTITIES. The formulas given are based upon 100 percent of the labeled content of the ingredients. Assay reports should be obtained from the supplier for all active constituents. Wherein assay reports show a content that deviates from 100 percent of the active constituent, the working formulas must be adjusted to compensate for the difference. If the assay control of the final product shows a consistent loss due to procedural factors, which do not cause toxicity or further degradation, the working formula should also be adjusted to compensate for such loss. Whenever available, only reagent or ampul grade chemicals should be used. When the total volume of solution to be made is 20 liters or less, or for other reasons is not to be made in the stainless steel mixing tank, the solution is to be adjusted to final volume by weight, the required weight equal to the volume specified having been determined by a carefully executed trial pro-

cedure. The accuracy of observation and execution of a weighing is much greater than that of a volume measurement in large containers. Weighing the final quantity of solution also eliminates such variables as the fluctuation of volume due to temperature differences from one procedure to another.

WATER FOR INJECTION. Water for Injection (W.F.I.) will normally be made with the Steril-Aqua unit and be prepared just prior to use. The maximum conductivity permitted for this W.F.I. is 2.5 micromhos or 1.0 p.p.m. as sodium chloride. A pyrogen test must be performed on the W.F.I. for at least every 2000 liters of production.

FILTRATION. The stability of solutions can be significantly affected by filtration through a dirty filter candle. Therefore, filter candles must always be thoroughly cleaned. The procedures specified in this manual are the minimum required for adequate cleaning. Where trace cross-contamination may be particularly serious, it is necessary that filter candles be retained for use only with one solution. This does not, however, reduce the specified cleaning requirements. Separate sets of filter candles may be retained, for example, for solutions containing myotics and other sets for solutions containing mydriatics.

EQUIPMENT. There is an equipment check list for every preparation. It should be checked two days before the procedure. Equipment must always be kept scrupulously clean. Glassware should be thoroughly scrubbed, rinsed, re-rinsed with W.F.I. and allowed to drain. No towels or other lint-producing substances should be permitted around clean glassware and other equipment.

New rubber tubing should be rinsed thoroughly, autoclaved in 0.5 percent sodium pyrophosphate solution, and rinsed thoroughly with W.F.I. Between subsequent uses, rubber tubing and connections must be thoroughly rinsed with distilled water and finally with W.F.I. before being prepared, in a damp condition, for resterilization. Old rubber tubing should be discarded and replaced with new tubing when it shows signs of deterioration, such as, cracks, hardening and discoloration. Valves and other hard-to-reach areas of equipment must be rinsed thoroughly following each use and re-rinsed with W.F.I. When necessary they should be disassembled for more thorough cleaning.

The pump on the movable stainless steel tank must be disassembled for thorough cleaning from time to time. At all other times, it must be thoroughly rinsed with W.F.I., along with immediately connecting pipe lines. The inaccessible parts should be filled with benzalkonium chloride solution (1:1000) and left until used the next time.

STERILIZATION. Clean glassware should be capped with aluminium foil and sterilized in a hot air oven whenever possible. When sterilized by autoclaving, clean glassware must be moist and capped with nylon cloth under Kraft paper, or with glassine under aluminum foil. All tubing, filter candles and other equipment to be sterilized by autoclaving must be clean, moist and wrapped with nylon cloth and Kraft paper.

In all sterilization processes, adequate time must be determined and allowed for the lag time required for the particular sterilization process and for each substance to be sterilized. Each procedure must be adequately controlled with time and temperature indicators.

Products which are to be sterilized by autoclaving must not be overheated. Prolonged heating may cause harmful degradation of the product. Therefore, the sterilization period should be as short as possible, consistent with adequate thermal sterilization requirements. Also, the subsequent cooling period should be reduced to a minimum, consistent with safety precautions and preservation of the integrity of the containers. At the end of the sterilization period, this may normally be accomplished by turning the control valve to manual operation and exhausting at a moderate rate, requiring a period of 5 to 10 minutes. No sterilized equipment should be used without resterilization if it has been held in reserve for a period of more than two weeks. It should always be resterilized if there is any question concerning the integrity of the seal.

CONTAINERS AND CLOSURES. Glass containers for parenteral solutions should be composed of Type I (borosilicate) glass. Greater chemical resistance will be found if Type I treated containers are used. Soda-lime treated or untreated containers should not be used for solutions unless careful studies have shown them to be compatible with the solutions. Even in such circumstances, repeated use of soda-lime treated containers would probably not be possible because of the limited endurance of the treated surface of the glass container.

Glass containers should be sterilized by means of hot air (Process L). By this process they will be rendered sterile, pyrogen-free, and dry. Where facilities for hot air sterilization are not available, less desirable processes must be employed, as described in this manual.

Closures for parenteral solutions must be selected with great care. The surest test for compatibility of a closure with a particular solution, is the storage, at various temperatures and including an autoclaving cycle, of samples from each lot of closures in the solution with which it is to be used. One rubber closure formulation will probably not be suitable for use with all proposed products and a particular lot of a rubber closure formulation that had previously been found to be suitable might not be.

The cleaning of rubber closures requires careful attention. The processes given in this manual should be considered to be minimal. Autoclaving greatly facilitates the removal of contaminating ions from the closure, particularly when performed more than once. Equilibration of added substances with rubber closures is necessary when the partition coefficient of the added substance favors the rubber closure.

II. Procedural Notations

ENVIRONMENT AND PERSONNEL. Access to the Sterile Technics Laboratory shall be restricted to authorized personnel only. There may be no traffic in or out of the Sterile Room after a sterile procedure has begun. All equipment and supplies must be introduced through the pass-window, from the Preparation Room personnel to Sterile Room personnel. Bottles, flasks and similar equipment should be placed in the Sterile Room prior to the beginning of the procedure so that they can be irradiated externally by the ultraviolet light or introduced at the beginning of the procedure after being wiped with a lint-free cloth wet with benzalkonium chloride (1:1000). Wrapped equipment should be introduced through the pass-window at the beginning of the procedure by the Preparation Room personnel. The outer wrapping should be loosened by the Preparation Room personnel and presented at the pass-window so that the Sterile Room personnel can grasp the equipment by the inner wrapping.

Sterile Room personnel must wear freshly laundered gowns, caps, and face masks. Filtered air, under positive pressure must be blown into the Sterile Room throughout the procedure.

Following the completion of a procedure, the Sterile Room must be cleaned. Within 24 hours prior to re-use for a sterile procedure, the ceilings, walls fixtures and all equipment in the sterile room must be wiped down with benzalkonium chloride solution (1:1000). The ultraviolet lights must be turned on for at least 12 hours prior to a sterile procedure and are preferably left on at all times except when personnel are in the room. The ultraviolet tubes must be wiped with a cloth dampened with alcohol at least once a week to remove dirt and grease. Periodically the ultraviolet lamps must be checked for the efficiency of output of ultraviolet light.

When the Sterile Room personnel enter the room prior to the beginning of a sterile procedure, the ultraviolet lights should be turned off and the floor should be sprayed with a disinfectant solution. The positive air pressure unit should be started. The air filters should be replaced with clean filters when the pressure differential drop is 1 inch.

Nutrient agar culture plates should be exposed for 20 minutes in the Sterile Room at least once a month. They should be exposed during a filling procedure, especially dur-

ing an aseptic fill. After incubation the count on any one plate should not exceed 3 colonies. Colony counts higher than this indicate personnel unduly contaminating the atmosphere, inadequate cleaning and antiseptic wipe down of the room, ineffective ultraviolet irradiation of the room, ineffective filtration of the incoming room air, or a neglect of one or more procedural rules for Sterile Room operation. Extra sterile scissors, forceps, towels and similar miscellaneous equipment should always be available.

FILTRATION. Filtration should be performed on the counter outside the hood, for convenience. During filtration the filter candle should be covered with solution at all times to maintain maximum filter area. The vacuum should be broken at the end of filtration, or at an interruption in filtration, by allowing air to enter through an air filter. If a fritted glass filter is used, it should be of coarse or medium porosity. Be careful always not to handle or unduly expose the adapter and nipple of candle, for this comes in contact with the solution.

FILLING. While working under the hood keep vials and equipment as far back from the front edge of the open hood as possible. Remember always to stand or sit so that breath is deflected by the glass panel of the hood. Be careful of radiation from ultraviolet light. Closures should be sterilized in Pyrex containers. Closures should be drained before use and should remain covered so as not to pick up lint from the air. Operation of the filling machine should not be interrupted any more than necessary. When it is necessary to stop filler, restart filler at the same speed and discard or recirculate the first delivery after again starting the machine. Gum rubber tubing is not recommended on the filling lines because it will expand or stretch with the pressure of the delivery. Tubing for the filter and related equipment should preferably be made up as a complete unit and sterilized in a tray assembled and ready to be installed.

Tubing and other pieces of equipment coming in contact with solutions must not be touched with the bare hands. If they must be handled they should be handled while wrapped in a nylon cloth. Jackets used in the Sterile Laboratory should be of long sleeve length. Trays should be placed to the right or to the left of filler in order that more room will be available. Then, open vials, other equipment, and supplies that must be kept sterile, may be kept entirely under the hood. Vials, during filling, should be covered with sterile nylon cloth, uncovering just the row or rows of vials to be filled. If trays, used for vials, have open bottoms or mesh bottoms, the entire tray with vials should be wrapped in nylon cloth.

In handling vials it is essential to remember several things. First, only a few vials should be exposed at one time. The vials should be arranged so that it is not necessary to reach over the open mouths of the vials. The vials should be handled by the side of the vial and not by the lip. When placing closures in the mouth of the vials, or when filling, begin with the vials nearest the operator and work away from the operator. Always avoid reaching over or working over the open vials.

III. Master Procedures

Sampling Plans for Sterility Testing and Quantitative Assay

The same product units are to be used for sterility test, pyrogen test (when required), and for quantitative assay or other tests.

Plan AA

1. **Used for products sterilized by autoclaving. Ten product units are selected.**
2. **Select one product unit from each "corner" of the top and bottom shelves or layers and two product units from the center of the load.**
3. **If there is but one layer of product units, take duplicate units from each "corner" and from the center of the load.**
4. **Affix tag to nine units with manufacturing lot number of product.**
5. **Affix tag to tenth unit with lot number and formula of product.**

Plan BB

1. **Used for products filled aseptically, without terminal sterilization. Ten product units are selected.**
2. **Select the first two product units filled, one unit each after approximately 10 percent, 20 percent, 40 percent, 60 percent, 80 percent, and 90 percent of the filling procedure, and the last two product units filled.**
3. **Affix tag to nine units with manufacturing lot number of product. Number consecutively in the order in which selected.**
4. **Affix tag to tenth unit with lot number and formula of product.**

Cleaning and Preparation of Filters for Reuse

Process A (Selas Candles, Acid Treated)

1. **After use, do not allow candles to dry out.**
2. **Reverse flush with at least 1000 ml. of distilled water. Brush gently the candle surface before reverse flushing.**
   Method: For candles under 10 p.s.i. test (pressure in-line filter type), attach nipple coupled to candle to pump outlet.
   For candles greater than 10 p.s.i. test (vacuum filtration type), remove mantle from candle assembly. Invert candle into vacuum flask and attach nipple with tubing to reservoir of distilled water. Pull vacuum in flask and pull water through candle in reverse direction.
3. **Drain candle. Perform bubble pressure test.**
   Bubble Pressure Test Method: Attach pressure tubing to nipple of damp candle. Immerse entire candle in container of distilled water. Attach other end of pressure tubing to supply of nitrogen gas under pressure. Gradually increase pressure within candle until bubbles form uniformly over entire surface of candle. The pressure at which bubbles first appear is the p.s.i. recorded value for the bubble pressure test.
   If the values found are lower than those in the following chart, do not use the candle. If they are higher or bubbles appear on candle irregularly, the candle is probably dirty and requires cleaning by Process B.
   Coarse clarification (Selas 10):2 to 5 p.s.i.
   Medium clarification (Selas 01):5 to 10 p.s.i.
   Fine clarification (Selas 015):12 to 18 p.s.i.
   Aseptic (Selas 02):20 to 28 p.s.i.
   Special aseptic (Selas 03):30 to 38 p.s.i.
4. **Allow to stand about 30 minutes with candle covered with 10 percent hydrochloric acid, then filter about 400 ml. of acid through candle.**
5. **Rinse thoroughly, by filtration, with distilled water (approx. 5000 ml.) until conductivity of rinse water is not more than twice (normally 5 micromhos) that of the distilled water.**
6. **Pass at least 1000 ml. of W.F.I. through the candle by filtration.**
7. **Wrap candle assembly in nylon cloth and paper and autoclave at 121° C. for 45 minutes. Write, with indelible ink on paper wrapping, the p.s.i. test results, date of sterilization, and product for which used (if applicable).**
8. **Do not use without resterilization if stored more than two weeks.**

Process B (Selas Candles, Ignited and Acid Treated)

1. **After use, do not allow candle to dry out.**
2. **Reverse flush with at least 1000 ml. of distilled water. Brush gently the candle surface before reverse flushing. For method, see Step 2, Process A.**
3. **Allow to stand about 10 minutes with candle covered with 10 percent hydrochloric acid and then filter about 400 ml. of acid through candle.**
4. **Rinse thoroughly, by filtration, with distilled water (approx. 3000 ml.).**
5. **Remove rubber connectors and dry thoroughly at about 100° C., or by comparable means.**
6. **Ignite in muffle furnace at about 1400° F. for 1-2 hours. Cool slowly.***
7. **Reverse flush with at least 1000 ml. of distilled water, or until effluent is clear.**
8. **Drain candle. Perform bubble pressure test. See Step 3, Process A.**
9. **Pass at least 1000 ml. of W.F.I. through candle by filtration.**
10. **Wrap candle assembly in nylon cloth and paper and autoclave at 121° C. for 45 minutes. Write, with indelible ink on paper wrapping, the p.s.i. test results, date of sterilization, and product for which used (if applicable).**
11. **Do not use without resterilization if stored more than two weeks.**

*** If furnace not available, return to Selas Corp. for ignition.**

Process C (Selas Candles, W.F.I. Rinsed)

1. **After use, do not allow candle to dry out.**
2. **Reverse flush with at least 4000 ml. of distilled water. Brush gently the candle surface.**
3. **Drain. Perform bubble pressure test. See Step 3, Process A.**

4. Pass at least 4000 ml. of W.F.I. through candle by filtration.
5. Wrap candle assembly in nylon cloth and paper and autoclave at 121° C. for 45 minutes. Write, with indelible ink on paper wrapping, the p.s.i. test results, date of sterilization, and product for which used (if applicable).
6. Do not use without resterilization if stored for more than two weeks.

Cleaning and Preparation of Filters

Process D (Selas Candles)

For Steril-Aqua System Candles

1. Note the conductivity range daily during the use of the candles for the preparation of Water for Injection (W.F.I.).
2. When the daily conductivity range begins to show an increasing trend, note the range with particular care.
3. A conductivity range maximum of 4.5 micromhos or higher for three days of operation is sufficient evidence to require the replacement of the filter candles in the Steril-Aqua System units.
4. Or, the filter candles should be replaced when the flow rate of distillate shows an appreciable decrease; with or without an increase in conductivity.
5. Remove the candles and discard.
6. Replace candles with new teflon-coated candles.
7. Flush candles by operating the Steril-Aqua System until the distillate is clear and the conductivity is at the required low level of 2.5 micromhos.

Cleaning and Preparation of Filters for Reuse

Process E (Ertel Filters)

1. After use, dismantle the assembly and discard filter pads.
2. Thoroughly scrub the assembly components until clean.
3. Remove the porous stone disc and boil for 15 minutes in 0.5 percent sodium pyrophosphate solution. Rinse thoroughly with distilled water. Soak in fresh distilled water for at least 30 minutes.
4. Immerse the stone disc in 10 percent hydrochloric acid for one hour. Rinse thoroughly with distilled water. Leach in fresh distilled water for at least one hour, changing the water three or more times during the leaching period.
5. Assemble filter, including new asbestos pads.
6. Pass at least 2000 ml. of W.F.I. through the assembly by filtration.
7. Loosen bolts, cover outlets with glassine paper, wrap unit in Kraft paper and autoclave for 45 minutes at 121° C. Write, with indelible ink on the paper wrapping, the asbestos pad number, date of sterilization, and product for which to be used (if applicable).
8. Do not use without resterilization, if stored for more than two weeks.
9. Tighten bolts before use. Discard the first portion of filtrate (approx. 200 ml.), that is passed through the filter.

Cleaning and Preparation of Equipment for Sterile Oleaginous Preparations

Process F

1. Preferably, a complete set of equipment should be reserved for exclusive use with sterile oleaginous preparations.
2. All rubber components must be of neoprene for maximum resistance to oleaginous materials.
3. After use, rinse equipment with acetone. Equipment such as filter candles and filling valve assemblies must be soaked in a solvent and then rinsed by forcing the solvent through the passageways. Valves may need to be disassembled for adequate cleaning.
4. Again rinse, using Alcohol U.S.P. Make sure that all of the oil has been removed.
5. Wrap equipment with nylon cloth. Apply outer wrapping of Kraft paper, seal with autoclave tape, and mark package to identify contents and date of sterilization.
6. Autoclave at 121° C. for 45 minutes. Exhaust rapidly.
7. Place package in hot air oven at a temperature of 80° to 90° C. until dry (approx. 2-3 hours). *Do not over-heat.*
8. Cool before use.
9. After use, clean as above without undue delay.

Cleaning and Preparation of Rubber Closures

Process G (W.F.I. Treated)

1. Thoroughly rinse washer with distilled water. Use large home-laundry type agitator washer for 43 mm. black disc closures. Use small Southern Cross stainless steel agitator washer for 20 mm. closures.
2. Place closures in washer and sufficient *hot* 0.5 percent sodium pyrophosphate solution in distilled water to the fill mark on the washer or to adequately cover the closures. Suspend disc closures in washer in nylon mesh bag.
3. Agitate for 20 minutes for new closures and 30 minutes for reused closures. Keep cover on washer.
4. Rinse thoroughly with repeated quantities of distilled water until closures are free from detergent. The conductivity of the final rinse water should be not more than that of the distilled water. Remove closures from rinse water by lifting out of the water (do not pump out water first).
5. Immerse the closures in W.F.I. and autoclave at 121° C. for 20 minutes.
   Containers to be used: for 43 mm. black discs - use stainless steel bucket with glassine paper under aluminum foil cover, double thick.
   for 20 mm. closures - use Pyrex wide mouth screw cap jars, cover with nylon cloth, screw cap in place over nylon after autoclaving.
6. Pour off the water and rinse with W.F.I. Lift out of the W.F.I., rinse and transfer to another container. Add sufficient W.F.I. to cover the closures and again autoclave at 121° C. for 20 minutes.
7. If supernatant liquid is clear (if not, repeat step 6 until clear), pour off the liquid and allow closures to drain before use. Keep covered with original sterile covering until used.

Cleaning and Preparation of Rubber Closures

Process H (Equilibrated With Bacteriostatic Agents)

1. Perform steps 1 through 5 as in Process G.
6. Pour off the water and rinse with W.F.I. Lift out of the W.F.I., rinse and transfer to another container. Add sufficient W.F.I., containing the same concentation of bacteriostatic agent and/or antoxidant as that to be in the finished product, to cover the closures and again autoclave at 121° C. for 20 minutes.
7. If supernatant liquid is clear (if not, repeat step 6 until clear). pour off the water and allow closures to drain before use. Keep covered with original sterile covering until used.

Process I (W.F.I. Treated and Dried)

1. Perform steps 1 through 6 as in Process G.
7. If supernatant liquid is clear (if not, repeat step 6 until clear), pour off the liquid and allow closures to drain.
8. Drain closures thoroughly. Replace cover on containers, aseptically, but do not tighten.
9. Place container and contents in hot air oven at a temperature of 80° to 90° C. until dry (approx. 2-3 hours). *Do not overheat.*
10. Tighten covers on containers. Cool. Keep covered until used.

Cleaning and Preparation of Containers for Sterile Solutions

Process J (Cleaned and Autoclaved)

1. Immediately upon return to Pharmacy, remove and discard caps and closures (except discs), and soak used containers (vials, flasks, or bottles) in hot detergent solution for at least one hour.
2. Scrub thoroughly by hand the entire inside and outside of each container with a stiff brush. Give particular attention to the bottom, shoulder and lip of each container.
3. Discard broken, chipped or stained containers.
4. Rinse with tap water in inverted position on jet rinser. Drain.
5. Store, inverted or covered, in a dust-free location until needed.
6. In preparation for use, rinse on jet rinser with tap water (about 2 seconds), steam (about 5 seconds), and hot Water for Injection (about 3 seconds). Or, if 100 ml. vials or smaller, rinse in Metromatic rinser using automatic cycle of tap water followed by filtered steam.*
7. Place damp containers upright in metal trays.
8. Immediately, wrap tray and contents with clean nylon cloth. Place outer wrapping of Kraft paper around tray and contents, seal with autoclave tape, and mark package to identify contents and date of sterilization.
9. Autoclave package of containers at 121° C. for 45 minutes. Position package on its side in autoclave so that steam will reach all parts of the containers.
10. During filling, expose the mouths of no more than 4-6 containers at one time. Immediately after filling close the containers with rubber closures.

* For new containers, begin with Step 6.

Process K (Cleaned and Immediately Filled)

1. Perform steps 1 through 5 as in Process J.
6. Prior to use, rinse the containers on jet rinser with tap water (about 2 seconds), steam (about 5 seconds), and hot Water for Injection (about 3 seconds). Or, if 100 ml. vials or smaller, rinse in Metromatic rinser using automatic cycle of tap water followed by filtered steam. Drain.*
7. Place containers, inverted in racks, to drain for the shortest possible time before being turned over and filled. Or, place

thoroughly drained containers upright in racks or trays and cover with cellophane sheets. Expose the mouths of no more than 4-6 containers at one time for filling.
8. Immediately after filling close the containers with rubber closures.

* For new containers, begin with Step 6.

Process L (Cleaned and Hot Air Sterilized)

1. Perform steps 1 through 7 as in Process J. For new containers begin with step 6, Process J.
8. Cover vials carefully with aluminum foil. Mark foil to identify contents and date of sterilization.
9. Place tray in hot air oven and heat at 160°-170° C. for 6 hours. Cool.
10. During filling, expose the mouths of no more than 4-6 containers at one time. Immediately after filling, close the containers with rubber closures.

IV. Master Formulas

Atropine Sulfate Injection, 0.4 mg. per 0.4 ml., J.M.C.H.—10 ml. vials

Atropine Sulfate, U.S.P.	4.0 Gm.*
Sodium Bisulfite, A.R.	4.0 Gm.
Sodium Chloride, A.R.	33.4 Gm.
Benzethonium Chloride	0.4 Gm.
N/10 Sodium Hydroxide, A.R. q.s.	
Water for Injection, to make	4000.0 ml.

FOR MULTIPLE DOSE USE.

Procedure:

NOTE: All weighings and measurements must be checked and initialed on formula record by a second qualified person.

1. Thoroughly steam a clean, tared 4 liter Pyrex bottle or volumetric flask in an inverted position. Rinse, inverted, with hot Water for Injection (W.F.I.). Drain.
2. Place approximately 3000 ml. of W.F.I. in the bottle or flask. Add and dissolve in succession the sodium bisulfite, benzethonium chloride, atropine sulfate, and sodium chloride with constant mixing.
3. Add, slowly and with vigorous mixing, sufficient N/10 sodium hydroxide (approx. 20 ml.) to adjust the pH to 3.5±0.2. Measure electrometrically.
4. Add sufficient W.F.I. to make the final volume (weigh at 4016 Gm., 30° C.).
5. Filter the solution through a Selas candle (12-18 p.s.i. test), previously prepared by Process A, using an all glass assembly for vacuum filtration. Collect the filtrate in a clean, dry, sterile (dry heat) Pyrex filter flask. Check for clarity. Refilter, if necessary, until free from particulate matter.
6. Cover the mouth of the flask and side connection with glassine under aluminum foil.
7. Using automatic pipetter equipped with a coarse sintered glass filter on the intake line, place 10.5 ml. of solution in 10 ml., Type I glass vials (Wheaton 20th Century), previously prepared by Process J.
8. Close vials with rubber closures (West stock No. 124 gray, "B" corkage), previously prepared by Process G. Place closures on neck of vial with sterile forceps and push into neck with thumb, insert into neck of vial with sterile Pyrex glass tube attached to vacuum line, or insert into neck of vial with hands covered with sterile rubber gloves.
9. Apply single lacquered aluminum cap (West stock No. 20-10) and seal with Fermpress crimper.
10. Sterilize the filled vials by autoclaving for 20 minutes at 121° C. Cool quickly**.
11. Quarantine product until all inspection and testing procedures have been completed. During the quarantine period send 10 vials, selected according to Sampling Plan AA for U.S.P. sterility test and U.S.P. quantitative assay for atropine sulfate.
12. Required test results:
    Sterility—No vial may show microbiological growth.
    Quantitative—Combined sample from ten vials, performed in duplicate, must show atropine sulfate content of 0.9 - 1.1 mg./ml.
13. After satisfactory test results have been received, inspect visually all vials under baffled direct light against a black and white background. Reject and discard all vials showing color change, evident particulate matter, or gross irregularity in fill.
14. Release for labeling with control number all vials passing requirements of the tests.
15. File one vial for reference. Retain for five years.

* See General Notices, Quantities.
** See General Notices, Sterilization.

Equipment Required:
3—Pyrex bottles or Erlenmeyer flasks, 4 liter, sterile.
3—Pyrex filter flasks, 2 liter, sterile.
3—Pyrex volumetric flasks, 2 liter (reserve), sterile.
2—Pipettes, measuring, 10 ml., sterile.
2—Pipettes, measuring, 1 ml., sterile.
4—Selas candle assemblies, 12-18 p.s.i. test, No. 86, sterile.
2—Vacuum line assemblies with air filter (from vacuum source to filter flasks), sterile.
4—Pipetter line assemblies with coarse sintered glass tube filters, valves, syringes (30 ml.), and delivery tubes, sterile.
4—Solution siphon assemblies (from solution reservoir to filter mantle), sterile.
2—Forceps (or: rubber gloves; or, Pyrex tube with vacuum hose), sterile.
1—Magnetic stirrer.
2—Magnetic stirrer bars, 1½", sterile.
1—Balance, Prescription, Class A.
1—Weight set, Metric.
1—Balance, capacity to 10 Kg.

Isotonic Sodium Chloride Injection, U.S.P.—20 ml. vials.

Sodium Chloride, A. R.	450 Gm.*
Benzyl Alcohol, A.R.	500 ml.
Water for Injection, to make	50,000 ml.

FOR MULTIPLE DOSE USE.

Procedure:

NOTE: All weighings and measurements must be checked and initialed on formula record by a second qualified person.

1. Rinse clean stainless steel tank with at least 20 liters of hot Water for Injection (W.F.I.). Pump through lines and discard. Thoroughly treat inside of tank and lines with Steril-Aqua steam, obtained by shutting off the Steril-Aqua System coolant (condenser water). Again rinse with 20 liters of hot W.F.I. Pump through lines and discard.
2. Place approximately 40,000 ml. of W.F.I. in tank. Add and dissolve the sodium chloride with constant mixing. Cool, then add and dissolve the benzyl alcohol with thorough mixing.
3. Add sufficient W.F.I. to make the final volume. Mix thoroughly.
4. Filter the solution through a Selas candle (12-18 p.s.i. test), previously prepared by Process A, using pressure pump filtration. Collect the filtrate in clean, steamed, rinsed (W.F.I.), and drained 10 liter Pyrex bottles, immediately after rinsing with filtrate. Check filtrate for clarity. Refilter, if necessary, until free from particulate matter.
5. Cover the mouth of the bottles with glassine under aluminum foil and transfer to sterile room.
6. Using automatic pipetter equipped with a coarse sintered glass filter in the intake line, place 20.6 ml. of solution in 20 ml., Type I glass vials (Wheaton 20th Century), previously prepared by Process J.
7. Close vials with rubber closures (West stock No. 124 gray, "B" corkage), previously prepared by Process G. Place closures on neck of vial with sterile forceps and push into neck with thumb, insert into neck of vial with sterile Pyrex glass tube attached to vacuum line, or insert into neck of vial with hands covered with sterile rubber gloves.
8. Apply single lacquered aluminum cap (West stock No. 20-10) and seal with Fermpress Crimper.
9. Sterilize the filled vials by autoclaving for 20 minutes at 121° C.
10. Quarantine product until all inspection and testing procedures have been completed. During the quarantine period send 10 vials, selected according to Sampling Plan AA, for U.S.P. sterility test and U.S.P. quantitative assay for sodium chloride.
11. Required test results:
    Sterility—No vial may show microbiological growth.
    Quantitative—Combined sample from ten vials, performed in duplicate, must show sodium chloride content of 8.5-9.5 mg./ml.
12. After satisfactory test results have been received, inspect visually all vials under baffled direct light against a black and white background. Reject and discard all vials showing evident particulate matter or gross irregularity of fill.
13. Release for labeling with control number all vials passing requirements of the tests.
14. File one vial for reference. Retain for five years.

* See General Notices, Quantities.

Equipment Required:
6—Pyrex bottles, 10 liter.
2—Graduates, 500 ml., sterile.
1—Stainless steel tank with cover, pump and mixer, 100 liter, sterile.
2—Selas candle assemblies, 12-18 p.s.i. test, pressure line type, sterile.
4—Pipetter line assemblies with coarse sintered glass tube filters, valves, syringes (30 ml.), and delivery tubes, sterile.
2—Forceps (or: rubber gloves; or, Pyrex tube with vacuum hose), sterile.
1—Balance, sensitivity about 1 Gm., capacity about 1 Kg.
1—Weight set, Metric.

* Must be sterile.

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PHOTO FROM PRESBYTERIAN ST. LUKE'S HOSPITAL, CHICAGO

procedures involved in QUALITY CONTROL of pharmaceuticals in hospitals

by SALVATORE D. GASDIA

> Pharmacy has for its primary object the services which it can render to the public in safeguarding the handling, compounding and dispensing of medicinal substances.[1]

► IT IS NOT A SIMPLE MATTER TO ACCOMPLISH this objective. In retail pharmacy each prescription is dealt with individually by the pharmacist and, therefore, the exercise of the necessary precautions is considered to be relatively easy. Each operation of the compounding of a prescription is carefully performed and the product is then dispensed to the particular patient for whom the prescription was written. It may be assumed that the preparation will be consumed in a relatively short time.

In practicing hospital pharmacy or pharmaceutical manufacturing circumstances are different, as the manufactured products may receive wide distribution and generally they will not be consumed in a short time. For this reason, control methods become mandatory and accomplishment of the objective noted in the Code of Ethics involves a somewhat complex procedure of quality control.

Three Factors Involved

In order to have a perfect quality control for any pharmaceutical product, three factors are involved: (1) Preparation, (2) Stabilization, and (3) Standardization. The relative importance of each factor depends mostly upon the nature and the use of the product.

Control procedures are involved in pharmaceutical preparations to the extent that each ingredient of each

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1. From the Code of Ethics of the American Pharmaceutical Association.

formula must meet the quality specification called for in the finished preparation. To this end, the control facility must aid in establishing the desired specifications and must carry out such work as is necessary to ensure that the material complies with the established standards.

The stability of a product, such as we are concerned with, involves physical and/or chemical changes in the product subsequent to manufacturing, packaging and storage. These changes may involve discoloration, precipitation, chemical decomposition, and bacterial or mold growths, all or one of which may result in loss of desired therapeutic activity. The above reactions may occur as a result of changes in *p*H, contamination by microörganisms, or chemical incompatibility.

The standardization procedure is concerned with the compliance of the finished product to the specifications for potency and therapeutic activity as contained in the formula and on the label. In the preparation of each batch, necessary qualitative and quantitative determination of ingredients by titrimetric, gravimetric, spectrophotometric, and other means will permit for adjustment to exact potency prior to packaging of the product.

System of Records

It is absolutely essential to establish control facilities to permit the proper operation of the pharmaceutical service in the hospital. Such facility should function separately from actual manufacturing.

In order to insure maximum controls and safeguards for the pharmaceutical service, the following system of records, procedures and techniques may be adopted.

Records

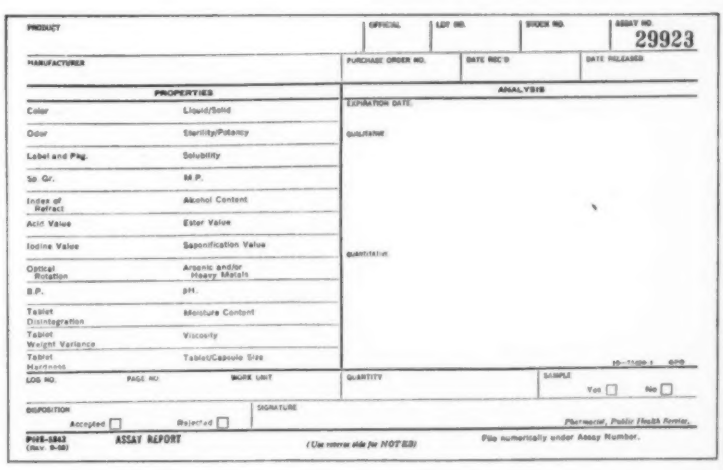
A. CONTROL CARD

A serial, prenumbered card is assigned to every product, whether manufactured, reprocessed, prepackaged, or received into the pharmacy. (See Figure 1.) Vital information is contained on each card, such as:

1. Name of product.
2. Batch number or manufacturer's lot number.
3. The assay number (the control number).
4. Source of supply or manufacturer.
5. Date received and accepted.
6. Various tests that may be performed.
7. Quantity received.
8. Sample retained or not.
9. Page reference to daily log book.
10. Purchase order number.
11. Signature of analyst and person in charge of laboratory.

Necessary information is transferred from the control card to the master control card.

Figure 1. Control Card assigned to every product




PRODUCT

☐ OFFICIAL
☐ NOT OFFICIAL

METHOD OF ANALYSIS

PHS-1841
6-52

MASTER ANALYTICAL CONTROL

File alphabetically under Product Name

DATE	MANUFACTURER	MFG'R LOT NO.	PURCHASE ORDER NO.	QUANTITY	ASSAY NO.	DISPOSITION	SAMPLE

PHS-1841
6-52

BACK

Figure 2. Master Control Card assigned to every item received in the pharmacy

B. MASTER CONTROL CARD

A card (See Figure 2.) is assigned to every different item received into the pharmacy, indicating the following information:

1. Face side.
   a. Name of product.
   b. The assay procedure to be followed for the particular preparation.
   c. Other tests that may be performed, such as:
      (1) *p*H
      (2) Viscosity
      (3) Specific gravity
      (4) Alcohol determination
      (5) Moisture determination
      (6) Sterility
      (7) Others
2. Reverse side.

   This includes a record of previous batches, indicating the following:
   a. Date.
   b. Name of manufacturer.
   c. Batch or lot number.
   d. Purchase order number.
   e. Quantity.
   f. Assay or control number.
   g. Disposition (accepted or rejected).
   h. Sample retained or not.
3. Filed alphabetically by product name.

C. DAILY LOG BOOK

This book should contain a daily record of the techniques (weighings, measurements, mathematical calculations and other necessary data) used in the analysis of the product. It must also contain information transferred from the control card such as name of product, date, quantity of batch, lot number, and control number. The signature of the analyst must be at the bottom of each page upon the completion of the tests. The pertinent data as well as the book number and page number must be transferred to the control card.

D. OTHER LOG BOOKS

These books may contain other studies such as stability, investigational and research studies.

E. ACCEPTED LABEL

All carrier cartons of items received and items released for issue by the control laboratory, must bear a label showing the following:

1. The word *ACCEPTED* in large type.
2. Date of acceptance.
3. Control number.
4. Name of accepting unit.

Procedures

A. CONTROL OF RAW MATERIAL

In the control of raw material, there are a number of steps to be followed. Specifications must be established for each raw material purchased. These specifi-

cations may be obtained through consultation with the members of the pharmacy staff, through the use of official compendia, or from other sources. These specifications are the tools of standardization of the raw materials to be used in the manufacturing of the products. To insure that these specifications are maintained, a rigid control procedure must be followed throughout the life of the material. The specifications must be dictated to the prospective supplier. The material, when received, must be checked to see that it meets the required specifications. When found to comply, the material is then accepted, tagged with a label indicating so and then stored until ready for use. To insure the quality of the raw material, the following procedure should be followed.

1. Specification for raw material.
   a. Official compendia.
   b. By consultation with the pharmaceutical service.
   c. Other sources
      (1) American Chemical Society Specifications
      (2) *Journal of Pharmaceutical Sciences*
2. Receipt of material.
   a. Material is placed in a quarantine area.
   b. Collection of a representative sample of the lot.
   c. Assignment of control number.
   d. Master control card (reference for tests to be performed).
   e. Actual performance of analysis in the daily log book.
      (1) Physical analysis
         (a) Labeling
         (b) Cleanliness
         (c) Color
         (d) Texture
         (e) Others
      (2) Chemical analysis
         (a) Identification
         (b) Qualitative
         (c) Quantitative
         (d) Others
   f. Acceptance.
      If material complies, an *accepted* label is attached to the material in quarantine which is now released and transferred into bulk storage.
   g. All information is transferred to the control card and master control card.
   h. Sample is retained and filed.

B. CONTROL OF PRODUCT DEVELOPMENT

The quality control of the finished product differs from the quality control of raw material in that variable and complex problems exist. Chief among these problems are stabilization and standardization, which being closely related are here treated as one problem. In treating this problem, the first factor to be considered is the establishment of a formula to be followed in the manufacturing of each product. The formula may be obtained from the official compendia, the members of the pharmacy team, or other sources. Various formulations are studied under conditions of accelerated aging, accelerated aging being a temperature of 45°C. This will give an approximate acceleration of three to one. That is, one month at 45°C will be equivalent to about three months at room temperature. When the formula is tested and found to be acceptable, the proven formula is then recorded on a card which may be referred to as a master formula card. The following procedure should be followed to insure that the best formulation is produced.

1. Stabilization and Standardization.
   a. Established formula—official.
      For the most part, difficulties along this line are not encountered. However, certain conditions may arise.
      (1) Container—If content interacts with the container, a special container is to be considered.
      (2) Cap liners—If content has a solvent action, a special liner is to be used.
      (3) Contamination—Dust, dirt, bacteria, etc.
      (4) Chemical itself—During storage may hydrolyze, may pick up moisture or lose moisture, may become discolored.
      (5) Periodic examination of stock in storage.
   b. Nonofficial formula
      (1) The formulas are established by consultation. Trial batches are made and samples submitted. These samples are then observed at accelerated aging for a minimum of six months. Samples are also kept at room temperature and under refrigeration.
      (2) Assay schedule
         (a) Original assay.
         (b) Two week assay of accelerated aging sample.
         (c) One month assay of accelerated aging sample.
         (d) Two month assay of accelerated aging sample.
         (e) Three month assay of accelerated aging sample.
         (f) Etc.
      (3) Evaluation of results.
         As a result of the evaluation of the product at any point of the six month period that proves it to be unstable, appropriate changes are made and the procedure started all over again. When at the end of the six months the item proves satisfactory, the formula is released for production. The samples kept at room temperature and under refrigeration, together with shelf stock, are observed and checked periodically. Records are maintained in the log book.

C. CONTROL OF FINISHED PRODUCT.

A manufacturing work sheet is prepared from the master formula card. The work sheet together with the formula card is forwarded to the control laboratory for assignment of the control number and various checks. The checks are made for errors in transposition of figures and also notation as to any analytical procedures to be performed on the product, such as *p*H determination at a certain stage of production, a moisture determination on a chemical before adding to the product, or viscosity determination, etc. The work sheet, formula card, and control card are returned to the manufacturing section. After the product is manufactured, a sample together with the assigned control card is forwarded to the control laboratory. Physical and chemical tests are performed, to insure the product meets the prescribed specifications.

If the product fails to meet the standard, it is returned to the manufacturing section with recommendations for adjustment to make the product meet the

established specifications. After adjustments are made, a sample is again forwarded to the control laboratory and tests are repeated. If results of retests are satisfactory, the product is then released for packaging. This release should be accomplished in the following manner. A note or memorandum together with an *accepted* label, initialed by the control laboratory, is forwarded to the manufacturing section. The label is affixed to the product storage container which now authorizes the personnel to package the product. After packaging, the product is again checked for elegance, labeling, etc. Liquid preparations that are intended for internal use are now placed in a quarantine area while bacteriological tests are conducted. The bacteriological control involves the plating of the product to insure that no contamination occurred during the process of filling. The product is checked for total bacterial count which should not exceed 100 colonies per ml. of preparation and in no case should there be evidence of gram-negative, non-sporulating bacilli. If the product now conforms to the bacterial count, the product is then accepted and ready for distribution. An *accepted* label is then placed on each case of packaged item and the product is released for storage and/or use. This procedure can be broken down to the following steps.

1. Master formula card and manufacturing work sheet is submitted to the control laboratory for calculation checks. The control number is assigned and all data returned to the manufacturing section.
2. Sample of batch, completed or incompleted, submitted to the control laboratory.
3. Physical examination and measurements of product.
   a. Appearance.
   b. Viscosity.
   c. *p*H.
   d. Pharmaceutical elegance.
   e. Results recorded in log book.
4. Chemical analysis.
   a. Spectrophotometric.
   b. Gravimetric.
   c. Moisture Determination.
   d. Titrimetric.
   e. Others as needed.
   f. Results in log book.
5. Transfer all required data from log book to control card.
6. Insert control number on manufacturing sheet and some indications of acceptance of product or recommendation for dilution together with original assay results.
7. Forward data to manufacturing section.
8. Manufacturing section complies with recommendations.
9. If product is changed by dilution or fortification, a sample is resubmitted and procedure is carried out again except that no new number is assigned.
10. If results of recheck are satisfactory, the product is released for packaging.
11. After product is bottled and labeled, a check is again made as to labeling and general elegance of the finished product.
12. Bacteriological Tests.
    a. Bacterial Count.
       (1) Oral liquid preparations
       (2) Nasal preparations
       (3) Ear preparations
    b. Sterility Tests.
       (1) Collyria
       (2) Injectables
       (3) Any sterile preparation
13. An accepted label is then put on each packing carton.
14. Product released to storage area.
15. Sample of product is retained and kept on file.
16. All necessary data is transferred to master control card and final disposition of product is noted.

The combined effect of the technique of the manufacturing section and the control exercised by the analytical and control laboratory provides for products of exacting potency and a high degree of pharmaceutical elegance. It is easily possible through these procedures to consistently produce medications that are quantitatively and qualitatively identical.

While this paper deals primarily with the control of products compounded by the pharmacy, this procedure, with slight modification, is also applicable to final products purchased from various commercial manufacturers.

Costs

From time to time there has been some question of the costs involved in a control operation. A control unit may be established at a relatively low cost. Furthermore, such a facility can be of great value in the operation of the total hospital. The initial investment for equipment should not exceed several thousand dollars. Utilization of the equipment to determine product compliance with specifications on many hospital supplies and equipment will provide top quality supplies and thus better patient care. The control unit will pay for itself by helping responsible hospital officials evaluate sources for drugs and related commodities. It will be possible to accept low bids and still be assured of the quality of the product, since the product will have been tested and evaluated by the control unit.

A control facility is a vital function in the overall business and professional operation of the hospital. Such a facility may vary in size and scope in accordance with hospital activity, but regardless of size, will provide for a higher level of pharmaceutical services and medical care in any hospital and will be evidence of the best effort possible "in safeguarding the handling, compounding and dispensing of medicinal substances."

Confederate field pieces under attack by Custer's men near Culpepper Court House, Sept. 14, 1863 —drawing by Edwin Forbes

HOSPITALS OF THE CONFEDERACY

by NORMAN H. FRANKE

► AS THE WOUNDED SOLDIERS WALKED, CRAWLED, hobbled, or were carried in wagons to Richmond, the women of the Confederacy rallied to their aid. But this was more than a matter of nursing the men back to health. Grape shot and minnè balls had to be removed from dangerous wounds. The surgeons in the city hospitals applied their skill as rapidly as possible, but as each successful operation added to the crowded ward rooms, the women of Richmond had to open their homes to relieve the congested conditions. Ladies' clubs and socially prominent women rented buildings and purchased bedding to convert these places into rest homes. Some private civilian physicians were hired or volunteered to act as resident doctors in some of the larger projects.

Noble though these actions were, efficiency could not exist under these conditions. It became difficult to keep track of soldiers or know where extra beds might be available. Congress acted promptly, placing all rest homes or private hospitals under the direction of the Surgeon-General's Office. Here an interesting bit of politics came into play, but in a most charming manner. A Miss Sally Thompkins had opened a small

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private hospital in Richmond, devoting all her time and energies to healing the wounded. Resenting having to relinquish the control of her hospital, she appealed to President Davis. In view of her efficiency and the exceedingly low mortality rate in her hospital, Jefferson Davis, in order to allow her to remain in charge, offered Miss Thompkins a captain's commission, which she accepted but refused the compensation accompanying it, thereby becoming the first woman to hold a commission in an American army.[1]

Hospitals sprung into being literally overnight. Between Richmond and the front lines, homes, barns, apothecary shops, and all types of buildings were converted into wayside hospitals and first aid stations. And as the casualty lists grew longer, the people turned their eyes towards Richmond and desired to aid their loved ones. State legislatures passed Relief Acts and appropriated funds for hospitals to be established near the army. In these state-supported institutions wounded or sick soldiers from that particular state could receive care from their friends and neighbors. The "State Rights" doctrine of the sovereignty of the state caused the people and their representatives to feel it imperative that each state care for its own. This relieved the burden on the Medical Department's budget and added a "homely touch" to the surroundings of the suffering soldiers. Alabama sent her own "Angel of Mercy," Mrs. A. F. Hopkins, wife of State Senator Arthur F. Hopkins, to take charge of the State hospitals at Richmond. An able administrator, Mrs. Hopkins did a splendid job caring for Alabama's sons.[2]

1. Burroughs, William B.: A Lady Commissioned Captain in the Army of the Confederate States, *Southern Practitioner 30*:532-534 (1909).

2. *Hopkins Papers,* State Department of Archives and History, Montgomery, Alabama.

She also let it be known that she spent at least $500,000 of her own funds for care and comfort of the soldiers.[3] Governors, politicians, and wealthy citizens toured their state-operated hospital, bringing news and good cheer from home and sustaining the morale of the men. Others, such as Dr. J. M. Trotter, who had obtained the endorsement of General Nathan Bedford Forrest (and who would also consult for a fee), went from town to town founding ladies' aid societies. These groups collected, by various means, funds to purchase medical and hospital supplies and to make pillows and other comforts for the wounded of their state.[4] In this direction much relief was provided for the suffering soldiers that could not have been provided from Medical Department funds.

In the Spring of 1862, the first tent field hospital was constructed by the Medical Department of the Union Army. Marker Number Eight in the National Military Memorial Park in Tennessee states that it was on Shiloh's bloody field, April 7, that Captain B. J. D. Irwin, Assistant Surgeon and Medical Inspector for the Army of the Ohio, erected the first tent field hospital used in the war. This idea soon caught on and became quite commonplace with both Armies.[5]

It is difficult to give an approximate estimate of the number of hospitals in the Confederacy. If it may be in any way indicative, there were 83 such places in

3. Brennon, Peter A., Director of the State Department of Archives and History, Montgomery, Alabama, in a personal communication stated that the state records proved that every dollar spent from Mrs. Hopkins' private funds was replaced by the State Treasurer.

4. *Hospitals,* (Folder 68). State Dept. of Archives & History, Montgomery, Alabama.

5. Rice, Delong, *The Story of Shiloh,* Nashville, 1919, p. 22.

FORM 8.

REQUISITION FOR MEDICAL AND HOSPITAL SUPPLIES

Station ——— Period: ———

From ——— to ———

Command: Officers, ——; Enlisted Men, ——; All others entitled to Medicines, ——; Total, ———

Articles and Quantities on Requisition	On hand	Wanted	Articles and Quantities on Requisition	On hand	Wanted
Acacia,		lb.			
Acid acetic,		lb.			
" muriatic,		oz.			

——— ——— Surgeon.

Date, ———

N. B.—Requisitions will exhibit the quantity of each and every article "on hand," whether same be wanted or not. They will be transmitted in duplicate, and by different mails.

Hospital requisition form used by the Surgeon General's Office, C.S.A.

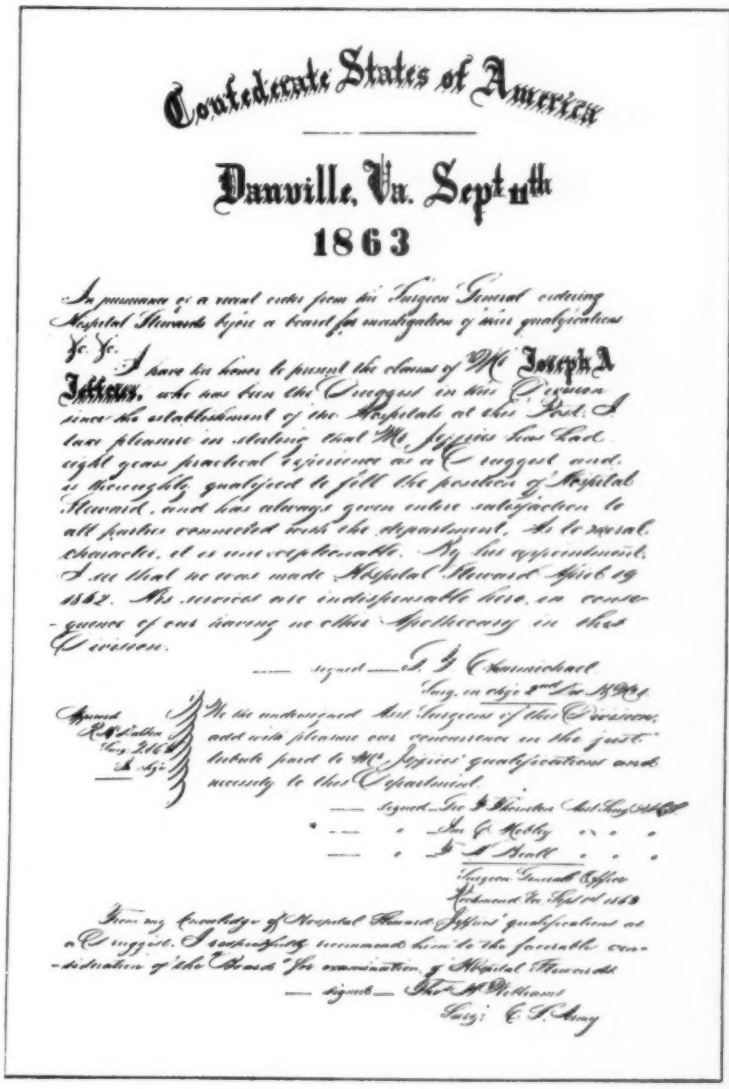
Alabama alone.[6] Hospitals ranged from about 40 beds (wayside hospitals usually having as few as five) to over 1000 beds.[7] The annual budget of the Medical Department for the hospitals was $3,540,000, which may be broken down as follows:[8]

Private physicians employed by contract ..	$ 150,000.00
Nurses and cooks (not volunteers)	240,000.00
Hospital stewards (including apothecaries)	60,000.00
Matrons and assistants	240,000.00
Ward masters	150,000.00
Laundresses	50,000.00
Hospital supplies (not including medical supplies)	2,650,000.00

This money together with donations from citizens and private groups constituted the operating funds. But due to the paucity of some supplies, the purveyors could not be relied upon to furnish every need, and so the Surgeon-General granted permission to procure essential material from any and every available source.[9] The funds were never adequate, and the Confederate Congress was always appropriating additional funds during any one fiscal year.

Having the best intentions, the hospitals endeavored to maintain peace-time efficiency and standards, but this could not be done, of course. It has been estimated that the over-all mortality rate in the hospitals was 14.2 percent,[10] a conservative figure, considering the conditions, sanitation, and medical knowledge of the time. Volunteer workers, no matter how well-intentioned, were at best poor substitutes for skilled personnel. The heroic women of the Confederacy worked hard and through long hours; their valiant efforts cannot be gainsaid. Nevertheless they were not experienced people and accidents and mistakes did occur. One hospital reported the death of a patient from an overdose of veratrum. The physician in charge had failed to order the discontinuance of the drug, and the volunteer nurse, knowing nothing of the action of the drug or the symptoms of veratrum poisoning, continued to administer the drug until death occurred.[11] At the Buchner Hospital at Gainesville, Florida, an unattended wounded soldier drank some carelessly placed turpentine, thinking it was whisky. After a physician brought him around, he found some real alcohol and drank himself to death.[12]

Copy of Report to the Board Investigating the Qualifications of Hospital Stewards



Confederate States of America

Danville, Va. Sept 11th 1863

In pursuance of a recent order from the Surgeon General ordering Hospital Stewards before a board for investigation of their qualifications &c &c. I have the honor to present the claims of Mr Joseph A Jeffries, who has been the Druggist in this Division since the establishment of the Hospitals at this Post. I have pleasure in stating that Mr Jeffries has had eight years practical experience as a Druggist and is thoroughly qualified to fill the position of Hospital Steward, and has always given entire satisfaction to all parties connected with the department. As to moral character, it is unexceptionable. By this recommend, I see that he was made Hospital Steward April 19 1862. His services are indispensable here, in consequence of our having no other Apothecary in this Division.

— signed — J. J. Carmichael
Surg. in chge 2nd Div. N.W.A.

We the undersigned Asst Surgeons of this Division, add with pleasure our concurrence in the just tribute paid to Mr Jeffries' qualifications and necessity to this Department.

— signed — Jno. F. Thornton Asst Surg C.S.A.
— " — Jas. C. Hobby " " "
— " — J. T. Heath " " "

Surgeon General's Office
Richmond Va. Sept 16th 1863

From my knowledge of Hospital Steward Jeffries' qualifications as a Druggist, I cordially recommend him to the favorable consideration of the Board of Examination of Hospital Stewards

— signed — Thos. H. Williams
Surgl C.S. Army

6. Howell, Vernon A.: Medical and Pharmaceutical Conditions in the Confederacy, *Bulletin of the North Carolina Historical Commission, 23*:72-103 (1918), pp. 80-82, gives a list of 153 large hospitals in the Confederacy. For a list of hospitals in Georgia see Jordan, Mildred, *Georgia's Confederate Hospitals*, thesis, Emory University Library, 1942.

7. *Hospitals* (Folder 68).

8. From a fragment of a Government Circular in the *Hopkins Papers.*

9. *Order and Letter Book, General Hospital, Front Royal, Virginia,* 1861, Confederate Museum, Richmond.

10. Black, May G.: Confederate Surgeons and Hospitals, *Confederate Veteran, 36*:183-185, (1928).

11. *Our Women in the War,* Charleston, 1885, p. 123, published by the *Weekly News and Courier* of that city.

12. Beers, Fannie A., *Memories,* Philadelphia, 1891, p. 63.

Too often the hospital stewards in charge of the dispensaries were unskilled personnel. Recuperating soldiers or disabled veterans often filled this role.[13] In some instances, the incompetence of the stewards was recognized, some of whom may well have been "draft-dodgers" or individuals seeking a sinecure. An effort was made to review the qualification of the stewards, for the Surgeon-General's Office ordered the establishment of a "board of review," How well this functioned is not known, but a report to this board is extant[14] and reads in its entirety:

Confederate States of America
Danville, Va., Sept. 11th
1863

In pursuance of a recent order from the Surgeon General ordering Hospital Stewards before a board for investigation of their qualifications.

I have the honor to present the claims of Mr. Joseph A. Jeffries, who has been the Druggist in this Division since the establishment of the Hospitals at this Post. I take pleasure in stating that Mr. Jeffries has had eight years practical experience as a Druggist and is thoroughly qualified to fill the position of Hospital Steward, and has always given entire satisfaction to all parties connected with the department. As to moral character, it is unexceptionable. By his appointment, I see that he was made Hospital Steward April 19, 1862. His services are indispensable here in consequence of our having no other Apothecary in this Division.

Signed - T. J. Charmichael (*Sic!*)
Surg. in chge 2nd. Div HQ Co.

Approved
R. M. [?] Dalton
Surg: 2nd Co. [?]
in charge

We the undersigned Asst. Surgeons of this Division, add with pleasure our concurrence in the just tribute paid to Mr. Jeffries' qualifications and necessity to this Department
Signed - George F. Thornton
Asst. Surg. PACS
Signed - John Cd Mobley
Asst. Surg. PACS
Signed - F. W. Beall Asst.
Surg. PACS

Surgeon Generals Office
Richmond, Va., Sept. 14, 1863

From my knowledge of Hospital Steward Jeffries' qualifications as a Druggist, I respectfully recommend him to the favorable consideration of the "Board" for examination of Hospital Stewards
Signed - Thomas H. Williams
Surg: C. S. Army

More than three out of every four soldiers who occupied hospital beds suffered from gunshot wounds. Many of these fell victim to hospital gangrene and erysipelas, the dreaded killers that claimed more men than bullets.[15] It is claimed that three soldiers succumbed from the ravages of disease for every one who fell in battle.[16] Chief among the ailments hospitalizing men were acute dysentery, chronic diarrhea, gastritis, chronic hepatitis, chronic bronchitis, laryngitis, nephritis, syphilis, chronic rheumatism, and hernia.[17] Indeed, Assistant Surgeon Joseph Jones commented after the war:[18]

> Chronic Diarrhea and dysentery were the most abundant and difficult to cure amongst any disease; and whilst the more fatal diseases, as typhoid fever, progressively decreased, chronic diarrhea and dysentary progressively increased, and not only destroyed more soldiers than gunshot wounds, but more soldiers were permanently disabled and lost to the service from these diseases than from disabilities following the accidents of battle.

The foregoing is designed to present a very brief sketch of Confederate hospital operations. Excellent and detailed studies on these hospitals have been made, and for those who wish to pursue this matter further, the following bibliography is included.[19]

13. Franke, N. H.: The Role of the Pharmacist in Confederate Hospitals, *Am. J. Hosp. Pharm. 15*:657 (Aug.) 1958.

14. The original is in the possession of William N. Hodgkin, D.D.S., Warrington, Virginia.

15. The shortage of surgical sponges in the South was an indirect blessing, for they were forced to use boiled rags, but the Federals used contaminated sponges, and lost many of their wounded from this cause. Prout, W. A.: Some Medicinal Substances employed by the South in the War between the States, *Amer. J. Pharm. 103*:336-340, p. 339, (1931).

16. Wiley, Bell Irwin: *The Plain People of the Confederacy,* Baton Rouge, 1943, p. 12; and Upson, Theodore F., *With Sherman to the Sea,* (Oscar O. Winther, editor). Baton Rouge, 1943, p. 89.

17. *Hospital Book, Ocmulgee Hospital, Macon Georgia, 1864,* Library, Emory University.

18. *Medical and Surgical History of the War of the Rebellion,* 6 vols., Washington, 1870-1888, II, p. 31.

19. For further information see:

Amiss, T. B.: Experiences of a Soldier and Surgeon, *Southern Practitioner, 29*:599 (1907).

Bernard, Mother M., *The Story of the Sisters of Mercy in Mississippi,* 1860-1930, New York, 1931;

Cunningham, H. H., *The Medical Service and Hospitals of the Southern Confederacy,* thesis, University of North Carolina, 1952;

Gildersleeve, J. R., History of the Chimborazo Hospital, C.S.A., *Southern Historical Society Papers, 36*:86-94, (1908); *Joseph Jones Papers, J. McKinney Papers,* and *George N. Thurston Papers,* Library, Louisiana State University, Baton Rouge;

Reeves, N. P.: Gun Shot Wounds of the Leg, External Sloughing of Tissues, *Southern Practitioner, 25*:98-100 (1903);

Stevenson, Isobel: Nursing in the Civil War, *Ciba Symposia 3*:848-919;

Stout, S. H.: Some facts of the History of the Organization of Medical Services of the Confederate Armies and Hospitals, *Southern Practitioner 24*:50-59 (1902); *25*:155-161, 274-283 (1903); *26*:91-98 (1904);

Tebault, C. H.: Hospitals of the Confederacy, *Southern Practitioner 24*:499-509 (1902) .

Richard, J. F. (editor), *The Florence Nightingale of the Southern Army, Experiences of Mrs. Ella K. Newson, Confederate Nurse in the Great War of 1861-1865,* New York and Baltimore, 1914.

National Hospital Week

— MAY 7 - 13 —

► OBSERVANCE OF NATIONAL HOSPITAL WEEK, May 7-13, once again offers hospital pharmacists an opportunity to cooperate in the overall hospital program. Following the theme, "Your Hospital—A Community Partnership," emphasis will be placed on the fact that, without the hospital, many members of the community would not realize their "heritage of health," and without community support, many hospitals would be unable to meet their communities' health needs. In a leaflet made available through the American Hospital Association, responsibilities of both the hospital and the community in maintaining the best possible health care are outlined. Accordingly these responsibilities are as follows:

• Patient care, its major responsibility. More than a million and a half hospital employees, using the newest techniques, stand ready around-the-clock to provide a multitude of services for the nation's sick and injured.

• Education of health personnel. All physicians and nurses receive part of their training in the hospital, as do many medical record librarians, x-ray technicians, physical therapists and dozens of other paramedical personnel. Without hospital training, these persons would be unable to provide the high quality of service necessary for the best patient care.

• Research. While the early stages of medical research may be carried out in the laboratory, work ultimately must be done in the hospitals. Nearly every medical advance has resulted from some type of investigation in a hospital.

• Preventive medicine. This may range from giving mass inoculations at the time of an epidemic to conducting classes in prenatal and child care or mental hygiene. This might also be called education of the community for better health.

The community's duties involve supporting the hospital, which is more and more coming to be a community health center. Support may be given to a hospital by:

• Volunteering of personal service to the hospital, either as a trustee or an aide.

• Encouraging young people to enter health careers. There is a major shortage of trained personnel in almost every health area.

• Participating in a prepayment program, such as Blue Cross, which helps assure stable financing of hospitals.

• Supporting programs for adequate reimbursement of the hospital by state and local governments for the care of welfare patients. This also helps stabilize the hospital's finances.

• Keeping informed about the hospital's problems, plans and progress.

The leaflet also points out that one out of every eight persons is expected to enter a hospital this year. For hospitals to maintain and to rise the quality of care for these 23 million Americans, they must be supported by their communities.

Education In Hospital Pharmacy

► THIS TOPIC is also not new since it was discussed by former Vice-President Tice five years ago, has received some attention by the Association and the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS, and was included in a panel on the subject on the program of the Association. It is, however, again mentioned because little has been accomplished in solving the problem and in setting patterns for its solution.

Much has been written about the educational requirements for the hospital pharmacist, but little has been done to attract any sizable number of students into this specialized training. This may be, in part, the fault of the colleges, but it becomes extremely important when one observes the rapid rise in the number of small hospitals which, no doubt, will continue. With this rise, there will be an increasing number of them without adequate pharmaceutical services; it also becomes important when one realizes that about 30 percent of the national dollar volume of drugs and pharmaceuticals is distributed by hospitals. This is expected to rise rapidly to 50 percent in the near future. It also becomes additionally important to the entire field of pharmacy if drugs and pharmaceuticals are to be distributed in hospitals by unqualified persons, as is the case in many instances today. It would appear that the five-year program offers a real opportunity to offer some hospital pharmacy training to fill this gap of inadequate pharmaceutical services in the small hospitals. This training might stimulate or interest students to consider graduate studies in this area.

It would appear that the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS has now become an organization of sufficient stature to lay plans of recruitment of more students into this study. I, therefore, recommend that the Committee on Hospital Pharmacy Education of this Association make a special study of education in hospital pharmacy under the five-year program as it relates to the small hospital and make a report with recommendations at the next meeting of the Association.

FROM Address of AACP Vice-President Henry M. Burlage: *Am. J. Pharm. Ed.* 25: 23 (Winter) 1961.

Siena Hall, Siena College

1961 INSTITUTES

A pharmacist reconstitutes medication in the Parenteral Solution Room at the Albany Medical Center Hospital.

► FOR THE SIXTEENTH CONSECUTIVE YEAR, hospital pharmacists throughout the country will have an opportunity to attend one of the three institutes being arranged by the American Hospital Association in cooperation with the American Pharmaceutical Association and the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS. As during the past year, two will be general institutes and one will be specialized. The sites for the two general institutes are Siena College, Albany, New York, June 19-23, and the University of California, San Francisco, August 7-11. Although this writeup is concerned with these two institutes, it should also be mentioned that the specialized institute is scheduled

Aerial view of Albany Medical Center

The Albany Medical Center Hospital Pharmacy Department cooperates in the Student Exchange Program. Here, Louis P. Jeffrey, pharmacist-in-chief, (center) discusses some material with Halit Okcuoglu, pharmacist (left) from Turkey, and Fay Peck, Jr., assistant pharmacist-in-chief

The Dispensing area at St. Peter's Hospital Pharmacy in Albany. The chief pharmacist, Sister Mary Thomas, R.S.M., is shown in the center

A scene at Siena College showing Serra Hall at the right and Plassman Hall in the background on left

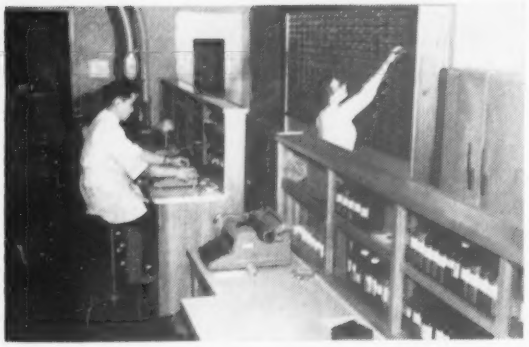
for November 6-10 at the Headquarters Building of the American Hospital Association in Chicago. Final program plans have not yet been developed but will be made available to all members of the SOCIETY within the next several months.

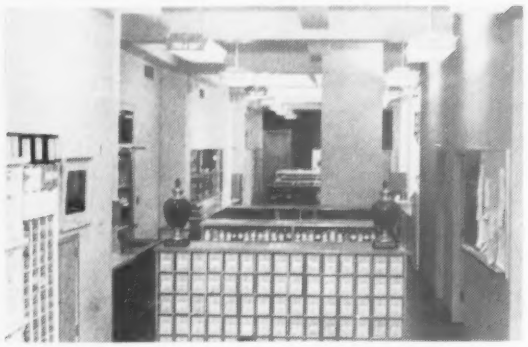
Announcement and registration forms for the Albany and San Francisco institutes will be sent to all active members of the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS as well as to all hospital administrators in member hospitals of the A.H.A. Registration for the institutes is handled through the American Hospital Association and applications are accepted in the order received. In accordance with the policy for setting up this type of meeting, the number of registrants is necessarily limited.

Arrangements for living in dormitories on the cam-

SIENA COLLEGE
ALBANY June 19-23

Manufacturing Section of the Pharmacy at the Veterans Administration Hospital, Albany





Views from the dispensing area at the University of California Medical Center

UNIVERSITY OF CALIFORNIA SAN FRANCISCO

August 7-11

puses of the respective sites of the institutes have been made. Also, meals for enrollees will be served in the school cafeterias. Special arrangements for housing members of religious orders attending the institutes have also been made.

Program Highlights

An advisory committee which includes the ASHP Committee on Program and Public Relations headed by Mr. Paul Parker, has been responsible for developing the general program themes. Those attending the institutes will hear specialists in each of the following areas:

1. Hospital Pharmacy Administration
2. Dispensing
3. Pharmacology and Therapeutics
4. Sterile and Non-Sterile Compounding
5. Special Hospital Pharmacy Functions

In each of these areas, faculty members will bring together new concepts along with actual demonstrations when feasible.

A session of particular interest at this time will be the symposium on "The Formulary System, the Pharmacy and Therapeutics Committee, and Hospital Formularies," which will cover the following:

1. The Principles of the Formulary System

A view of the Medical Center Campus at University of California Medical Center, San Francisco

U. S. Public Health Service Hospital, San Francisco

2. Organizing the Pharmacy and Therapeutics Committee
3. The Pharmacy and Therapeutics Committee in Action
4. Implementing the Decisions of the Pharmacy and Therapeutics Committee
5. The American Hospital Formulary Service

The Wednesday afternoon session is developed around possibilities for the hospital pharmacist to expand his role, including such activities as participation in an adverse drug reaction program, a poison control program, general background on hospital infection control agents, and the hospital pharmacist's responsibility for drug information.

In a session on Wednesday evening (the only night session at the 1961 institutes) institute enrollees will have an opportunity to participate, presenting any particular problems which they have solved or a gadget which has been useful.

This session is designed to give the institute registrants an opportunity to discuss briefly a situation or problem which they have solved or a gadget which they have put to use. A faculty member will begin on

Right: A view of San Francisco's cable cars with Golden Gate Bridge in the background. Below: Chinatown

Faculty

A—Albany
SF—San Francisco

R. DAVID ANDERSON, Assistant Director of Pharmaceutical Services, Ohio State University Health Center, Columbus, Ohio. (A)

CHESTER G. BAZEL, Veterans Administration Center, Los Angeles, Calif. (SF)

MARK BERKE, Director, Mt. Zion Hospital and Medical Center, San Francisco, Calif. (SF)

ROBERT C. BOGASH, Chief Pharmacist, Mt. Sinai Hospital, N. Y., N.Y. (A)

DONALD C. BRODIE, Ph.D., Director of Pharmaceutical Services, University of California Medical Center, School of Pharmacy, San Francisco, Calif. (SF)

EDWARD F. CROUMEY, Chief Pharmacist, Mary Fletcher Hospital, Burlington, Vt. (A)

TROY C. DANIELS, Ph.D., Dean, School of Pharmacy, University of California, San Francisco, Calif. (SF)

ARTHUR W. DODDS, Chief Pharmacist, U. S. Public Health Service Hospital, Staten Island, N. Y. (A)

FREDERICK N. ELLIOTT, M.D., American Hospital Association, Chicago, Ill. (A) & (SF)

FRANK C. FERGUSON, Jr., M.D., Professor of Pharmacology, Albany Medical College, Albany, N. Y. (A)

HERBERT L. FLACK, Assistant Director, Jefferson Medical College Hospital, Philadelphia, Pa. (A)

GEORGE W. GRAHAM, M.D., Director, Ellis Hospital, Schenectady, N. Y. (A)

GEORGE J. GRUBER, U. S. Public Health Service Hospital, San Francisco, Calif. (SF)

FERDINAND HAASE, JR., M.D., Medical Director, Albany Medical Center Hospital, Albany, N. Y. (A)

JACK S. HEARD, Chief Pharmacist, St. Francis Memorial Hospital, San Francisco, Calif. and President, American Society of Hospital Pharmacists, Washington, D. C. (SF)

W. KEVIN HEGARTY, Administrator, Greater Bakersfield Memorial Hospital, Bakersfield, Calif. (SF)

WILLIAM HELLER, Director of Pharmacy Service, University of Arkansas Medical Center, Little Rock, Ark. (A)

WENDELL T. HILL, Chief Pharmacist, Orange County General Hospital, Orange, Calif. (SF)

H. H. HIXSON, Administrator, University of California Hospitals, San Francisco, Calif. (SF)

WILLIAM W. HOTALING, Chief Pharmacist, Ellis Hospital, Schenectady, N.Y. (A)

LOUIS P. JEFFREY, Pharmacist-in-Chief, Albany Medical Center, Albany, N. Y. (A)

CLIFTON J. LATIOLAIS, Director of Pharmaceutical Services, Ohio State University Health Center, Columbus, Ohio. (SF)

RUSSELL LOVELL, Chief Pharmacist, Akron City Hospital, Akron, Ohio. (A)

STANLEY R. MARINCIK, Chief Pharmacist, University of California Hospitals, San Francisco, Calif. (SF)

JOSEPH A. ODDIS, Executive Secretary, American Society of Hospital Pharmacists, Washington 7, D. C. (A) & (SF)

PAUL F. PARKER, Director, Pharmacy and Central Supply, University of Kentucky Medical Center, Lexington, Ky. (A) & (SF)

PAUL R. PATTERSON, M.D., Professor of Pediatrics, Albany Medical College, Albany, N. Y. (A)

SISTER M. GONZALES, Chief Pharmacist, Mercy Hospital, Pittsburgh, Pa. (A)

SISTER MARY VERA, Chief Pharmacist, Mercy Hospital, Buffalo, N. Y. (A)

CHARLES G. TOWNE, Director, Area Medical Office, Veterans Administration, San Francisco, Calif. (SF)

RICHARD T. VIGUERS, Administrator, New England Medical Center, Boston, Mass. (A)

CHARLES A. WALTON, Ph.D., Professor and Head, Department of Materia Medica, College of Pharmacy, University of Kentucky, Lexington, Ky. (A)

JOHN W. WEBB, Director of Pharmacy Services, Massachusetts General Hospital, Boston, Mass. (A)

JEROME M. YALON, Associate Administrator, University of California Hospitals, San Francisco, Calif. (SF)

the first day of the institute to interview the registrants who may have something to offer for this session. The theme of this session—It Worked for Us—could be lengthened to include—It May Work for You.

Since both areas in which the institute will be held have a number of outstanding hospital pharmacy departments, tours have been arranged on Thursday afternoon. This will give enrollees at the institutes an opportunity to view several different types of hospital pharmacies in operation.

Clinic sessions, which have proved so valuable during recent years, will again be held each afternoon. The student body will be divided into groups of appropriate size, according to the bed capacity and type of institution with which the student is associated. With each group being assigned a leader, selected from the student body, total participation will be encouraged. The group leaders will meet daily following the clinic sessions to compare the answers to questions considered in the discussions. As noted in the program, a specific topic is assigned to the groups each day. At the end of the week a fifteen minute presentation concerning each discussion topic will be presented by selected group leaders.

The complete program along with the tentative faculty for the two institutes are included on the following page.

Local Participation

Members of the Northeastern New York Society of Hospital Pharmacists and the Northern California Society are cooperating in making special arrangements for institute enrollees. Also, in each instance, representatives from the schools of pharmacy in Albany and in San Francisco are giving helpful assistance.

Individuals actively participating in local arrangements include Mr. Louis P. Jeffrey at Albany Medical Center in Albany and Dr. Donald C. Brodie, University of California, San Francisco in cooperation with Mr. Jack S. Heard, St. Francis Hospital, San Francisco.

As mentioned above, applications for participation in the annual institutes are accepted in the order received. It is anticipated that both institutes will be over subscribed so that those planning to participate in either of the 1961 general institutes are urged to register as soon as the necessary application forms are received.

The annual institutes on hospital pharmacy have played a vital role in contributing to better pharmacy practice in hospitals. Over the past sixteen years, it is estimated that more than 2,000 practicing hospital pharmacists from throughout the country have taken advantage of this service made available through the national organizations. Those pharmacists who have not had an opportunity to participate in an institute will want to make every effort to register for the 1961 meetings.

1961 INSTITUTES - Programs

Monday, June 19, Albany and August 7, San Francisco

Theme: Hospital Pharmacy Administration
Presiding: Louis P. Jeffrey (A)
Clifton J. Latiolais (SF)

9:00— 9:30 A.M. Greetings and Orientation
9:30—10:15 A.M. Determining the Scope of Pharmacy Service
Herbert L. Flack (A)
Donald C. Brodie (SF)
10:15—10:30 A.M. Break
10:30—11:15 A.M. Developing Written Policies and Procedures
Panelists: Joseph A. Oddis and Paul F. Parker (A and SF)
11:15—12:00 Noon Principles of Supervision
Richard T. Viguers (A)
Mark Berke (SF)
12:00 Noon—1:30 P.M. Lunch
1:30— 2:00 P.M. Job Specifications and Job Descriptions
Sister Mary Vera (A)
H. H. Hixson (SF)
2:00— 2:45 P.M. Establishing the Pharmacy Budget
Panelists: Russell Lovell and George W. Graham (A)
Jack S. Heard and Jerome M. Yalon (SF)
2:45— 3:00 P.M. Break
3:00— 4:00 P.M. Guiding Principles to Hospital Charging
Moderator: Clifton J. Latiolais (SF)
R. David Anderson (A)
Panelists: George W. Graham and John W. Webb (A)
Jack S. Heard and Jerome M. Yalon (SF)
4:00— 5:00 P.M. Clinic Session

Tuesday, June 20, Albany and August 8, San Francisco

Theme: Dispensing
Presiding: Clifton J. Latiolais (A)
Troy C. Daniels (SF)

9:00— 9:45 A.M. Prepackaging and Labeling
John W. Webb (A)
Charles G. Towne (SF)
9:45—10:15 A.M. Handling and Control of Floor Stock Drugs
Herbert L. Flack (A)
Wendell T. Hill (SF)
10:15—10:30 A.M. Break
10:30—11:15 A.M. Regulations and Procedures for Handling Narcotics
Arthur W. Dodds (A)
George J. Gruber (SF)
11:15—12:00 Noon Providing 24 Hour Pharmacy Service
Edward F. Croumey (A)
Chester G. Brazel (SF)
12:00 Noon—1:30 P.M. Lunch
1:30— 4:00 P.M. Symposium—The Formulary System, the Pharmacy and Therapeutics Committee, and Hospital Formularies
Moderator: Joseph A. Oddis (A and SF)
Panelists: Frank C. Ferguson, Jr., William Heller, Louis P. Jeffrey, and Sister M. Gonzales (A)
Frederick N. Elliott, George J. Gruber, Jack S. Heard, and W. Kevin Hegarty (SF)
4:00— 5:00 P.M. Clinic Session

Wednesday, June 21, Albany, and August 9, San Francisco

Theme: Pharmacology and Therapeutics
Presiding: Robert C. Bogash (A)
Jerome M. Yalon (SF)

9:00—12:00 Noon The Pharmacology of Diuretics (A)
Charles A. Walton (A)
A Selected Pharmacology Topic (SF)
Donald C. Brodie, Coordinator (SF)
12:00 Noon— 1:30 P.M. Lunch
1:30— 2:00 P.M. The Pharmacist's Role in An Adverse Drug Reaction Program
Frederick N. Elliott (A and SF)
2:00— 2:30 P.M. Hospital Pharmacist's Role in A Poison Control Program
Paul R. Patterson (A)
Wendell T. Hill (SF)
2:30— 3:00 P.M. Hospital Infection Control Agents
Herbert L. Flack (A)
Chester G. Bazel (SF)
3:00— 3:15 P.M. Break
3:15— 4:00 P.M. Hospital Pharmacist's Responsibility for Drug Information
Paul F. Parker (A and SF)
4:00— 5:00 P.M. Clinic Session
7:00— 9:00 P.M. It Worked for Us

Thursday, June 22, Albany, and August 10, San Francisco

Theme: Sterile and Non-Sterile Compounding
Presiding: Sister M. Gonzales (A)
Donald C. Brodie (SF)

9:00—12:00 Noon Symposium and Demonstration: Sterile and Non-Sterile Compounding
Moderator: Clifton J. Latiolais (SF)
R. David Anderson (A)
Panelists: Russell Lovell, Edward F. Croumey, and William Heller (A)
Stanley R. Marincik and Staff, University of California Medical Center (SF)
12:00 Noon— 1:30 P.M. Lunch

Theme: Special Hospital Pharmacy Functions
1:30— 2:00 P.M. Research and Development in Hospital Pharmacy
William Heller (A)
Charles G. Towne (SF)
2:00— 2:30 P.M. Handling Investigational Drugs
Louis P. Jeffrey (A)
Jack S. Heard (SF)
2:30— 3:30 P.M. Clinic Session
3:30— 5:00 P.M. Hospital Pharmacy Tours

Friday, June 23, Albany and August 11, San Francisco

Theme: Special Hospital Pharmacy Functions (Cont'd)
Presiding: Herbert L. Flack (A)
Jack S. Heard (SF)

9:00—10:00 A.M. Services Available to Hospital Pharmacists from Professional Organizations
Joseph A. Oddis (A and SF)
10:00—10:15 A.M. Break
10:15—11:15 A.M. Review of Clinic Session Topics
11:15—11:45 A.M. Implementing Institute Information
Clifton J. Latiolais (SF)
R. David Anderson (A)
11:45—12:00 Noon Review Report to the Administrator
Louis P. Jeffrey (A)
Wendell T. Hill (SF)
1:00— 3:00 P.M. Luncheon
The Hospital Pharmacist and the Health Team (A)
Ferdinand Haase, Jr. (A)
The Hospital Pharmacist and the Pharmacy Profession (SF)
Troy C. Daniels (SF)
Presentation of Certificates

Therapeutic Trends

edited by WILLIAM JOHNSON

Paranylene—Anti-Inflammatory Agent In Arthritis

A study was undertaken by Poznanski and Wallace, as reported in *Canadian Med. Assoc. J. 83*:1302 (Dec.) 1960, to evaluate the potential anti-inflammatory and anti-arthritic properties of paranylene in patients who are suffering from different types of arthritic disorders and who, in the majority of cases, did not benefit greatly from previous medications. The majority of the patients studied had been treated previously with aspirin, phenylbutazone, corticosteroids and parenteral gold salts. It was observed that the minimal effective dose, particularly in the more severe cases, was 200 mg. daily. Treatment was continued from 4 to 36 weeks. The beneficial effects observed in 18 of 22 patients confirmed the anti-inflammatory properties of the drug in humans. It was found that no side effects of an endocrine or metabolic nature were produced by the compound.

KENNETH W. HUCKENDUBLER

Tranylcypromine With Trifluoperazine

Tranylcypromine with trifluoperazine is a new antidepressant agent of great promise. It has a rapid, smooth onset of action and a short interval of therapeutic lag before significant clinical improvement is noted. Clinical evaluation of 100 depressed patients who were treated with the drug indicates that it has prompt action, with few side effects, and no toxic reactions. Coronary occlusion complicated one case. An overall recovery or marked improvement rate of 83 percent was noted in this group. M. Straker states in *Canadian Med. Assoc. J. 83*:1306 (Dec. 17) 1960 that the drug is remarkably effective in groups of depressed patients who previously have shown a poor response to other therapies. Drug improvement is best aided and maintained by a larger therapeutic milieu, in which effective psychotherapy remains the prime and central factor. Tranylcypromine with trifluoperazine was supplied as Parstelin by Smith, Kline, and French Laboratories.

SYLVIA SCHMIDT

A New Compound, UML-491, In Prevention Of Headache

It is believed that vasodilation alone is not the complete reason for migraine headaches. Noxious agents which might lower the pain threshold are suspected. Acetylcholine, histamine, serotonin, and bradykinin have been suspected. With these facts in view, an agent which would suppress the actions of these compounds seems desirable. UML-491 (1 methyl-D-lysergic acid butanolamide) was found to have ability to inhibit the release of histamine and neutralize some actions of serotonin. The tests conducted by John Graham and reported in *New Engl. J. Med. 263*:1273 (Dec. 22) 1960, incorporated 113 patients. Seventeen patients were labeled 'no test' because of intolerance or incomplete data. This study is of short duration and should be classed as a pilot study.

Patients were divided into four groups. Group 1: atypical or ordinary migraine; Group 2: patients in whom elements of headache resulting from muscle tension are so mixed with vascular components that they might be called migraine-tension; Group 3: comprising patients suffering from a clear cut histaminic cephalgia; Group 4: patients who have suffered for years from atypical migraine that has latterly become accentuated and complicated by the advent of mild to moderate systemic hypertension. In groups 1, 3, and 4 the results were impressive. The beneficial effects of the drug on headache occurred within a day or two and disappeared in the same amount of time. Significant flare-ups of headache after withdrawal suggest that its effect depends upon suppressing or supplanting some inherent body mechanism that requires several days for recuperation. Some side effects were noted, the most severe being indigestion and nausea. Further trials seem to be warranted to confirm the effectiveness of UML-491. The drug seems to have little effect on the muscle-tension type of headache. The materials and much information on the pharmacology of UML-491 were supplied by Sandoz Pharmaceuticals.

RICHARD H. HARRISON

Methiomeprazine For Chronic Alcoholism

A newly developed phenothiazine, methiomeprazine (10-(dimethylamino-2-methyl propyl) methyl thiphenothiazine), was selected for study in chronic alcoholism because of its high potency and possibility of decreased incidence of side effects. Eighteen patients who were given this preparation were studied for periods ranging from 21-250 days. Most of these patients had

experienced other forms of therapy prior to this study, including Alcoholics Anonymous, use of disulfiram as well as more standard therapy with barbiturates, chloral hydrate, and other phenothiazines. Dosages of 20 mg. of methiomeprazine twice daily increasing to levels of 60-150 mg. daily were tolerated. All of the 18 patients reported marked improvement. They stopped drinking, gained weight, and were able to sleep without difficulty. Three of the 18 however, returned to constant heavy drinking and represent therapeutic failures. No serious toxic side effects were noted, although 3 patients developed edema which responded to salt restriction. Two facets of therapy of chronic alcoholism with methiomeprazine appear worthy of interest. First, that a psychopharmacologic agent can so affect the psychic pattern of a chronic alcoholic that he loses the drive to drink. Second, that at least some chronic alcoholics while taking the preparation as ordered, can return to the "normal" pattern of the occasional social drink without loss of all control. H. Levy *et al.* in *Current Therapeutic Research 3*:11 (Jan.) 1961 believe that methiomeprazine bears promise of being as close as any agent now available to being an ideal therapeutic agent for this difficult problem. Methiomeprazine was supplied by Smith, Kline and French Laboratories as SKF 6270.

SYLVIA SCHMIDT

A New Form Of Stabilized Peroxide As A Chemotherapeutic Agent

The widespread use of antibiotics has produced some problems such as developing of the resistant strains, especially *Staphylococcus aureus*. Some antimicrobial agents with proven efficacy have been neglected to some extent. Hydrogen peroxide has proven effective *in vitro*. The desirable qualities of hydrogen peroxide are its cleansing action, freedom from toxicity or sensitizing action. These qualities led to efforts to find a stable form of hydrogen peroxide for *in vivo* use. This report concerns the study of a urea peroxide in an ointment-like preparation. The product was designated T-3 and is called ointment-like because while possessing the outward and physical properties of an ointment it differs from the usual ointments in that it contains no water. The immediate purpose of this paper was to confirm that the ointment had retained the ability to give a prolonged release of oxygen in the presence of body fluids which catalyse the breakdown of urea peroxide. The product was tested for its detergent action. One hundred milligrams of charcoal was added to a blood sample. This was shaken and then 0.2 Gm. of the ointment was added and shaken for 2 minutes. The sample was 90 percent clear after 3 minutes. The ointment also showed encouraging effectiveness against 5 strains of resistant *Staphylococcus aureus*. These strains were proven resistant to penicillin containing from 1000 units to 1 million units/Gm. The study was conducted by Cobe and Ploumis and the results were reported in *Antibiotics and Chemotherapy 10*:766 (Dec.) 1960. The results of the test indicate that the product T-3 deserves further investigation.

RICHARD H. HARRISON

Effect Of o,p' DDD In Cushing's Syndrome

A drug, o,p' DDD, 2,2-Bis(2-chlorophenyl-4-chlorophenyl)-1-,1-dischloroethane, was found to suppress adrenocortical responsiveness. Based on these findings and other reports, the drug was used to treat a patient with non-tumorous Cushing's syndrome. Southern *et al.*, report in *J. Clin. Endocrinol. Metabolism 21*:201 (Feb.) 1961, the results of the drug test. In a sixteen week period during the trial, a total of 546 grams of the drug was administered. The initial dosage was 10 grams daily in four fractional doses. Side effects of severe nausea, recurrent vomiting and somnolence appeared after four weeks of therapy and necessitated the reduction of the dosage to four grams daily and then to three grams daily. There was a marked decrease in the urinary excretions of 17-OH-CS and 17-KS. At no time did the excretion go below normal. Six weeks after discontinuance of the drug the urinary excretions of neutral 17-KS increased and the drug was restarted. The excretion levels were promptly returned to normal. Smaller doses were found to be effective and will greatly reduce the side effects of the gastrointestinal and central nervous system which were noted with the larger doses. The drug appears to be a useful agent in the therapy of non-tumorous Cushing's syndrome. Further study is needed however to assess the long term effects. The material o,p' DDD was obtained from the Burrough Brothers Manufacturing Company, Baltimore, Maryland.

RICHARD H. HARRISON

A Potential Chemotherapeutic

In a study of some oxythiocarbohydrazide and hydrazone derivatives of their activity against *Mycobacterium tuberculosis, in vitro,* some antibacterial effects against staphylococci and streptococci were noted. Compound I, and 1-benoxythiocarbo -2- salicylidene hydrazine, and some of its analogs were tested for their activity against staphylococci and streptococci organisms. The compounds were dissolved in propylene glycol. The serial dilution method was used for testing the susceptibility of the organisms. The range of the concentration of the compound was from 200 to 0.2 mcg./ml. The susceptibility was measured by the minimal concentration required to completely inhibit growth. Compound I showed decided inhibition against strains of staphylococci and streptococci. However, this activity was greatly reduced by the addition

of normal horse serum. This fact may greatly limit the possibilities of its use. One of the analogs formed by substitution showed very much the same activity against the strains of staphylococci and streptococci. This compound was effected in the same way by the addition of normal horse serum. The antibacterial activity was greatly reduced. The study was conducted by Kurt Skagius and reported in *Antibiotics and Chemotherapy* *1*:31 (Jan.) 1961.

RICHARD H. HARRISON

Contergan-268

Contergan-268 (n-phthalyl-glutamic acid imide) is a derivative of piperidine with unique properties. Miller *et al.*, in *Antibiot. Med. & Clin. Therapy* *7*:743 and 747 (Dec.) 1960, report investigating the use of the drug in the treatment of inflammation and edema and the production of analgesia. Contergan-268 produced fair results in the treatment of active inflammation. The drug was much more effective in the prevention of edema from operation. Excellent analgesia also was produced by the use of a sufficient dose of Contergan-268. The drug is recommended for the treatment of pain as a substitute for the addictive analgesic drugs, particularly in those patients in whom a sedating action is desired. This sedative effect of the drug was further investigated in the treatment of patients with the withdrawal syndrome in chronic alcoholism. The drug does not have the disadvantages of toxicity, severe side effects, tolerance, and addiction. Large doses of the drug were well tolerated and produced excellent results, because the patients became quiet and cooperative in relatively short periods of time. Contergan-268 was supplied by the National Drug Company.

SYLVIA SCHMIDT

Kayexalate Used To Treat Hyperkalemia Of Renal Failure

Sodium polystyrene sulfonate is a cation exchange resin in the sodium phase. The sodium ions are attached to side chains of the resin structure and available for exchange. The higher the atomic weight of a cation, the greater the affinity of the resin. Thus, in an environment with potassium ions, sodium will be replaced by potassium. The resin is a finely ground, light brown powder and is administered in a suspension with water, ginger ale, or sorbitol. The average oral dose is 15 Gm., two to six times daily. To counteract constipation, and to provide for the eventual removal of the resin bound potassium, a mild laxative is used. Nausea and vomiting can be reduced by administration of one of the phenothiazine derivatives or may be overcome by administration of the resin suspension through a gastric tube. If vomiting cannot be controlled, the resin may be given by rectal administration, using proper technique. Rectal administration requires a higher dose, from 30 to 60 Gm. from 2 to 6 times a day.

In *J. Am. Med. Assoc.* *175*:689 (Feb. 25) 1961, Steinmetz and Kiley report the use of this treatment in 25 cases of hyperkalemia of renal failure. The results indicate that hyperkalemia of renal failure can be controlled in the majority of patients by proper oral or rectal administration of sodium polystyrene sulfonate in conjunction with restriction of potassium intake. The effectiveness of resin therapy depends on the availability of the gastrointestinal tract as a locus of exchange. The main untoward effect of the resin is hypokalemia and daily potassium determinations are

Electrical Anesthesia For Major Surgery

In *J. Am. Med. Assoc.* *175*:599 (Feb. 18) 1961, Hardy *et al.*, report the use of electrical current to produce surgical anesthesia. In 1956, these workers began experimenting with animals, and it was eventually found that a current of 700 cycles and 35 milliamperes, employing about 25 volts, would induce acceptable general anesthesia. Thereafter operations of various types were performed on more than 60 dogs and follow-up studies made. Extensive studies in animals established the basic simplicity of application and safety of the equipment for carefully controlled clinical evaluation of electrical narcosis. Two patients were operated upon under electrical anesthesia. One underwent exploratory laparotomy and the other simple mastectomy. The series is being increased with extensive monitoring by means of electroencephalography, psychological testing, blood gas analyses, and long-term follow-up.

WILLIAM E. JOHNSON

Win 14,098—A New Analgesic Agent

One of the more recently synthesized compounds, structurally similar to pethidine, is WIN 14,098. One hundred patients received WIN 14,098 in 20 mg. doses intramuscularly for relief of post-operative pain. Twenty patients were given the same dose prior to anesthesia, and a further 7 received an intravenous injection of 0.05 mg./lb. Clinical observation indicated that a 20 mg. dose of WIN 14,098 is about as potent as pethidine 100 mg. WIN 14,098 produced good analgesia. Side effects were minimal in the first two groups of patients but, in the third, marked respiratory depression occurred. Further trial of the drug is suggested as reported by Deacock in *Brit. J. Anaesthesia* *32*:590 (Dec.) 1960. Special caution is recommended when it is given intravenously. WIN 14,098 was supplied by Messrs. Bayer Products, Great Britain.

SYLVIA SCHMIDT

Timely Drugs

Buclamase

CHEMICAL NAME: Alpha amylase. Produced by a strain of non-pathogenic bacteria.
INDICATIONS: Amylolytic enzyme used in the management of inflammation, edema and pain in traumatic athletic injuries, surgical conditions, allergic states, connective tissue disorders and dental conditions.
SIDE EFFECTS: No reports available of sensitivity, irritation to the gums or buccal mucosa; or other side effects.
DOSAGE: Administered buccally in dosage of two tablets three to four times daily.
PREPARATION: Buccal tablet containing 10 mg. of alpha amylase with 1,250 units of amylolytic activity per mg.
PACKAGING: Bottles of 48 tablets.
SUPPLIER: Rystan Company, Mount Vernon, N.Y.

Oxaine

CHEMICAL COMPOSITION: Oxethazaine (N,N-bis-(N-methyl-N-phenyl-t-butyl-acetamido)-beta-hydroxyethylamine) in alumina gel.
INDICATIONS: A topical anesthetic in combination with the antacid and demulcent properties of aluminum hydroxide gel used for the management of chronic gastritis, chronic esophagitis without stricture, and the irritable bowel syndrome.
SIDE EFFECTS: Dizziness, faintness or drowsiness may occur in case of overdosage. Constipation, which may be aggravated by therapeutic doses, may be lessened by adequate fluid intake, use of dietary roughage or a mineral oil preparation.
DOSAGE: Adult dose is 1 or 2 teaspoonfuls 4 times daily, 15 minutes before meals and at bedtime.
PREPARATIONS: A suspension, each 5 ml. containing 10 mg. oxethazaine in alumina gel.
PACKAGING: Bottles of 12 fl. oz.
SUPPLIER: Wyeth Laboratories.

Provigen

COMPOSITION: A high protein content powder made from non-fat milk solids, calcium caseinate, and sucrose with added vitamins and minerals.
INDICATIONS: Protein supplement intended for persons following illness, injury, or surgery, and with dietary problems. Should not be used as an infant formula product.
DOSAGE: Four glasses of the beverage, three-fourths cup (4 oz.) in one quart of milk, adds 90 Gms. of protein to the diet. Each packed level tablespoonful supplies 4 Gms. protein.
PREPARATIONS: Cans of 1 and 4 pounds of the powder.
PACKAGING: Case of 12 units of 1 or 4 pound cans.
SUPPLIER: Mead Johnson.

Radio-Hippuran Sterile Solution (I^{131})

CHEMICAL NAME: Radio-iodohippurate sodium (I^{131}).
INDICATIONS: Studies of kidney function in relation to cases of hypertension and of suspected or known renal pathology by radioisotope diagnostic techniques.
DOSAGE: Administered intravenously in dosage of 0.4 uc. per Kg. of body weight.
PREPARATIONS: Sterile, pyrogen-free solutions for injection, each ml. of solution contains 0.2 to 1.5 mc. I^{131}.
PACKAGING: Rubber stoppered vials of 0.1, 0.25, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 mc.
SUPPLIER: Abbott Laboratories, Oak Ridge, Tenn.

Racobalamin-57

GENERIC NAME: Radio-cyancobalamin, a Co^{57} labeled vitamin B_{12}.
INDICATIONS: Diagnosis of pernicious anemia by the Schilling test, which measures output of vitamin B_{12}.
Test Procedure: Dose of 0.5 microcurie radio-cyanocobalamin is given orally by capsule or solution to patient. Drugs containing vitamin B_{12}, intrinsic factor, or similar medications are withheld for at least 2 days before the test. Immediately prior to the test, the patient empties his bladder. About 2 hours later, the patient is given 1 mg. of cyanocobalamin injection to enhance the excretion of active vitamin B_{12} in the urine. The urine is collected over the next 24 hours and measured for activity by the scintillation detector with a sodium iodide crystal. Standards are prepared from the original lab shipment, diluted to 5, 10, and 20 percent solutions, and counted under the same conditions as the urine was counted. The counts obtained with the standards against the percent output value are graphically plotted; subsequently, urinary outputs can be read directly in percent.
Diagnosis: If urinary output is less than 4 or 5 percent, patient has pernicious anemia, sprue, or an allied intestinal condition. If output is 10 to 12 percent or more, patient definitely does not have Addisonian pernicious anemia. For those few patients falling in the 5 to 10 percent range, and when it is desirable to differentiate between pernicious anemia and malabsorption due to other causes in patients in the 0 to 4 percent range, the test is repeated 2 to 3 days later.
PREPARATIONS: Capsules and sterile solutions containing 0.5 microcurie radio-cyanocobalamin (Co^{57}) each.
PACKAGING: Capsules containing 0.5 microcuries each. Sterile solution, 5 to 100 microcuries in multiple dose vial. Diagnostic Anemia Kit, containing 5 capsules, 0.5 microcuries each; 1 vial Bevidon (cyanocobalamin) sterile solution, 5 mg. in 5 ml., and 2 capsules Intrinsic Factor Concentrate, one test dose (60 mg.).
Note: All preparations are shipped daily by air express and the activity is calibrated for noon of day following shipment.
SUPPLIER: Abbott Laboratories, Oak Ridge, Tenn.

CONTROL OF POISONINGS

edited by **ALBERT L. PICCHIONI,** *Director, Arizona Poisoning Control Program*

Gastric Lavage vs. Emesis in the Treatment of Poisoning

► IN THE FIRST-AID OR MEDICAL TREATMENT of certain ingested poisons one of the chief measures involves the prevention of further absorption of the poison from the digestive tract. This may be achieved by two possible means, induced emesis or gastric lavage. In the case of first-aid treatment, the only course available to the layman for emptying the stomach is by means of induced vomiting. Included in the first-aid measures for poisoning as recommended by the Committee on Toxicology of the American Medical Association is the initial administration of large volumes of milk or water (1 to 2 cups for children ages 1 to 5; up to 1 quart for patients over 5 years of age) and the induction of vomiting by placing the blunt end of a spoon or a finger at the back of the patient's throat or by giving 2 tablespoons of salt in a glass of warm water.[1]

On the other hand, in the medical treatment of ingested poisons both induced emesis and gastric lavage are measures which may be employed by the physician. The technic to be employed for emptying the stomach in any given case of poisoning usually depends on factors such as the experience and preference of the physician, the nature of the ingested substance, and the availability of equipment. Little research has been done on the comparative efficacy of the two technics for the removal of swallowed poisons from the stomach and opinions differ as to which method is the more effective. For example, Goodman and Gilman[2] state, "The clinical value of emetics is very limited and the increasingly wide use of the stomach tube has relegated emetics to a deserved obsolescence." In contrast, an editorial in *The Journal of the American Medical Association*[3] cited the systematic investigation of Harstad and co-workers which challenged the efficacy of gastric lavage for removing swallowed poisons and concluded that it is generally inefficient and often valueless in cases of acute poisoning. These investigators further concluded that gastric lavage promotes passage of a poison into the intestine and suggested that the efficiency of lavage may be increased by the repeated use of relatively small volumes of fluid. They pointed out that lavage is usually ineffective if the poison had been swallowed for 4 hours or longer; the bulk of the poison leaves the stomach rapidly, especially in suicide victims, who often take it on an empty stomach; and in conscious patients evacuation by emesis with the aid of apomorphine is superior to lavage.

Recently, Arnold and associates[4] evaluated the efficacy of lavage and induced emesis in the treatment of experimental sodium salicylate poisonings in dogs. Essentially, their procedure consisted of administering sodium salicylate to dogs and determining the amount of drug that could be recovered from the digestive tract by induced emesis or gastric lavage. Although the data obtained were not statistically analyzed, these investigators concluded that: (a) lavage within 15 minutes of salicylate administration is no more effective than vomiting induced within 30 minutes of poisoning; (b) 1 hour after administration of sodium salicylate, lavage is far less effective than induced emesis; and (c) spontaneous emesis is not as effective as induced emesis. One and one-half hours after salicylate administration, induced emesis is still somewhat effective and thus appears to be the preferred procedure for removing salicylate from the stomach. Undoubtedly, one of the most significant features of the experiment reported by Arnold and co-workers is the observation that neither lavage nor emesis, under the most optimal conditions, is consistent in effectiveness. Consequently, they suggested that all patients, after either form of treatment, should be carefully observed for signs of further drug absorption.

Another obvious disadvantage in the use of gastric lavage is the fact that poisonous material of large particle size, such as enteric coated tablets and mothballs, cannot be aspirated through a lavage tube. Despite the apparent advantages of induced emesis over gastric lavage in the treatment of ingested poisons, the procedure is not entirely adequate or without danger. For example, the marked increase in blood pressure during emesis may result in cardiovascular accidents.[4,5] The marked increase in the intra-abdominal pressure during emesis may be dangerous in pregnancy, hernias, and advanced peptic ulcers or other gastrointestinal erosions.[5] Finally the fall in blood pressure after emesis may be dangerous in young children and debilitated persons.[5] Furthermore, it is well recognized that in cases of central nervous depression emetic agents not only may fail to exert their therapeutic ef-

fect but may add to the depression. Apomorphine and, to a lesser extent, ipecac are capable of causing further depression.[4] Also, Boyd[5] has pointed out that ipecac is irritating to mucosal surfaces and may produce gastroenteritis if it is not ejected from the stomach. More recently, Allport[6] reported a case in which a 2-½-year-old boy was given 15 ml. of ipecac fluidextract over a 30-minute interval following the accidental ingestion of approximately 6 chlorpheniramine (Chlor-Trimeton) maleate tablets, 4 mg. each. The boy then vomited violently for the next 8 hours. He continued to vomit intermittently for 2-½ days and developed a tarry diarrhea which was benzidine positive. The author pointed out that emetine is apparently the alkaloid primarily responsible for the toxic manifestations of ipecac and for the similarity in the toxicity of ipecac fluidextract and ipecac syrup. He emphasized the difference between the two preparations; the fluidextract is approximately 14 times more potent than the syrup. Although the use of ipecac syrup as a possible first-aid measure for the treatment of poisoning has been suggested, the Arizona Poisoning Control Information Center does not condone the lay use of ipecac preparations for this purpose because of their potential toxicity.

Because of the paucity of adequate experimental and clinical observations and in view of the shortcomings inherent in both gastric lavage and induced emesis for the purpose of removing swallowed poisons from the stomach, the Arizona Poisoning Control Information Center is unable to recommend one method in preference to the other. The choice of procedure for preventing further gastrointestinal absorption in any particular case of poisoning must necessarily depend on the condition and health of the patient, the nature and relative toxicity of the noxious substance, and the experience and preference of the attending physician. After evacuation of the stomach by either method the patient should be carefully observed for signs of additional drug absorption and treated accordingly. In general, when the patient is comatose or if the poison is a petroleum distillate or corrosive, evacuation of the stomach by either gastric lavage or induced emesis should be avoided. For poisoning cases in which these two procedures are contraindicated consideration should be given to the possible use of dilution, neutralization, or catharsis.

References

1. Recommendations of Committee on Toxicology on First-Aid Measures for Poisoning, *J.A.M.A., 165*:686, 1957.
2. Goodman, L. S. and Gilman, A., *The Pharmacological Basis of Therapeutics,* 2nd edition, The Macmillan Company, New York, 1956, p. 1064.
3. Editorial: Value of Gastric Lavage in Treatment of Acute Poisoning, *J.A.M.A., 133*:545, 1947.
4. Arnold, J., Hodges, J. B., and Barta, R. A., Evaluation of the Efficacy of Lavage and Induced Emesis in Treatment of Salicylate Poisoning, *Pediatrics, 23*:286, 1959.
5. Boyd, E. M.: Drugs Acting on Mucous Membrane and Skin, in: *Pharmacology in Medicine* by Drill, V. A., Ed., McGraw-Hill Book Company, Inc., New York, 1958, p. 694.
6. Allport, R. B., Ipecac is Not Innocuous, *J. Dis. Child., 98*:786, 1959.

Hypothermia in the Treatment of Carbon Monoxide Poisoning

► DEATHS FROM VARIOUS SOURCES of carbon monoxide poisoning amount to several thousand annually in the United States. Poisoning in the home as the result of defective heating appliances or as the result of inadequate ventilation accounts for over 100 of these fatalities.

Typically, poisoning from carbon monoxide gas is treated by removal of the victim to fresh air or by the administration of oxygen. In severe cases of poisoning, the victim is treated with pure oxygen, and, if respiration has failed, artificial respiration is also instituted.

Recently, Craig and co-workers[1] reported the successful use of hypothermia in the treatment of a case of severe carbon monoxide poisoning in an 18-year-old man. Several hours after admission to the hospital, the victim exhibited episodes of spontaneous decerebrate rigidity and failure to respond to painful stimuli. Since past experience indicated that survival is rare under such circumstances, the prognosis appeared hopeless. Hence, hypothermia was recommended because of the success reported by others with this therapy in other conditions associated with central nervous system hypoxia in humans and also in experimental animals subjected to carbon monoxide intoxication.[2] Ice was packed around the patient over a thin plastic sheet and the body temperature was lowered to 32°C (92°F) within 2 hours. Chlorpromazine was administered to control shivering. Twelve hours after hypothermia was instituted the patient responded to painful stimuli and attempted to talk. After 32 hours of continuous refrigeration, he spoke normally and could move his extremities well. Cold treatment was then discontinued and the patient was gradually rewarmed during the next 8 to 12 hours. At the time of discharge from the hospital, 2 weeks after admission, the patient was normal in mentality and personality and exhibited no neurological deficit. A follow-up study 8 months later showed him to be normal in every respect.

References

1. Craig, T. V., Hunt, W. and Atkinson, R.: Hypothermia —Its Use in Severe Carbon Monoxide Poisoning, *New Engl. J. Med., 261*:854 (October 22) 1959.
2. Giaja, J., Markovic-Giaja, L., and Sokic, P.: L'hypothermie expérimentale et la toxicité de l'oxyde de carbone et de la strychnine, *C. rend. Soc. biol. 149*:447, 1955.

TEXAS SEMINAR

Dr. John Autian (second from left) continues discussion of plastics as pharmacists seek further information about their uses in pharmacy and medicine

Hospital pharmacists who have attended the Texas Seminar for ten years receive certificates. Shown left to right are Paul R. Hudson, Houston; Doris M. Smith, Austin; and James D. McKinley, Jr., Houston. Not included in the photo is Charles R. Henry, Dallas

1961 Officers of the Texas Society are installed by Joseph Oddis (right). They are (l to r): Secretary Kenneth E. Tiemann of Austin, Treasurer Blanche M. Groos of San Antonio, Vice-President Reuben G. Lewis of Dallas, and President William A. Leisch, Jr. of McAllen

► HOSPITAL PHARMACISTS from throughout Texas turned out in record numbers for the Seminar conducted by the University of Texas College of Pharmacy and the Texas Society of Hospital Pharmacists, February 24, 25 and 26. Official registration was 110, twenty-five percent more than last year.

One of the leading speakers, Dr. Austin Smith, president of the Pharmaceutical Manufacturers Association, was unable to be present for the meeting due to travel difficulties but addressed the Seminar via a special telephone broadcasting arrangement from Los Angeles. His talk, "Truth and Science—Their Relationship to Health," compared the medical achievements of the "good old days" to those of the present.

"In my lifetime the people in the United States have experienced an increase in life expectancy from 50 years to almost 70 years," the 48-year-old Dr. Smith said. "They have seen the percentage of orphans decrease. They have learned that some diseases have become so rare there are not enough cases for teaching purposes today. And they have heard that some formerly common operations today are almost unknown.

"During this same period they have read. . . about daring new operations on the heart and brain. They have heard how the blood can be made to flow more easily or less easily at the beck and call of the surgeon. They have heard how the heartbeat can be slowed down or speeded up, how years can be added to the lives of so many victims of cancer, how the blood pressure can be raised and lowered at will."

When people wish for 'the good old days,' Dr. Smith said he doubts that "anyone would want the kind of health that was prevalent in the 'good old days'."

Dr. Smith cited some of these "so-called treatments" as representatives of that era and in conclusion emphasized that "health is something to be preserved carefully and only through wise application of scientific facts can this be achieved. Science is possible because discerning people have a deep regard for the truth."

Supervision Managerie

"In supervision, our goal is results through people and with people," stated Mrs. Pauline W. Burbrink as she personified various animals and objects and compared them to supervisor types. Mrs. Burbrink is director of research for the Distributive Education Department of the University of Texas. She cited some attributes of the effective supervisor as follows:

1. Treats people with sincerity and consideration.
2. Is always courteous.
3. Creates a good work climate.
4. Provides opportunities for all employees.
5. Sets high standards of performance.

Submitted through The University of Texas Pharmacy Extension Service, Luther R. Parker, Director.

Mr. Joe H. Arnette, Texas Pharmacy Board Secretary (center), helps to clarify questions about the Texas Pharmacy Law and the Texas Dangerous Drug Law

6. Reviews periodically all employees' performance.
7. Provides effective training and counseling.
8. Understands people and treats them as human beings whose feelings and attitudes deserve respect.
9. Backs employees up.
10. Is respected.
11. Accepts the responsibility of supporting and advocating management philosophies, policies and procedures.
12. Supervisor's attitude toward his own job can create the "good place to work" idea, too.
13. Times work properly.
14. Works methodically.
15. Does not get bogged down in unimportant details.
16. Solves one problem at a time.
17. Suggests rather than orders.
18. Likes to lead.
19. Expects employees to be prompt, regular, agreeable.
20. Expects skill, care and a full day's work from each employee and helps them give such.
21. Makes requests rather than gives orders.
22. Rarely tells everything he knows.
23. Never takes himself too seriously.
24. Can take criticism.

William A. Leisch, Jr., (left), 1961 President of the Texas Society, is presented a Geigy "Leadership Award" by Jack S. Darroh, representative from Houston

Timely Topics in Hospital Pharmacy

In a team discussion by Mr. Joseph Oddis, executive secretary of the AMERICAN SOCIETY OF HOSPITAL PHRAMACIST and Mr. Paul Parker, director of pharmacy-central supply at the University of Kentucky Medical Center, Lexington, highlights of activities in the national organizations were covered. In opening the discussion, it was pointed out that there are so many happenings of timely nature that it is difficult for the pharmacist on a practitioner level to follow so that meetings of this type are helpful for discussion and interpretation. Among items covered by the team included recommendations for liaison groups with state pharmacy boards, plans for the 1961 Institutes on Hospital Pharmacy, the program schedule for the Annual Meeting of the ASHP being held in Chicago in April, the ASHP's sponsorship of a foreign student exchange program and overall plans for the SOCIETY.

Paul F. Parker (left) and Joseph Oddis lead discussion covering "Timely Topics in Hospital Pharmacy"

Planning Pharmacy Central Supply Service

Also speaking in the area of "planning pharmacy central supply service," Mr. Paul Parker offered suggestions for planning an efficient service, outlining some new innovations based on the assumption that pharmacy service should be combined with central supply rather than a separate service as has been traditionally existent. He also suggested that in an ideal arrangement, nurses would be relieved of the responsibility of ordering drugs. This could be accomplished by routing the patient charts directly to the pharmacy, where the individual dosages would be prepared and delivered to the nursing station. These procedures would relieve the nursing staff to perform pure nursing duties more efficiently.

Conversation here centers around Dr. George Webber of the University of Houston College of Pharmacy who spoke on "Fiscal Problems of Hospital Management"

He also presented plans whereby work flow would be circular and all related functions could be consolidated. Such a closely integrated service complex believed to provide maximum efficiency in work flow, will be placed in operation at the University of Kentucky Medical Center in Lexington.

Fiscal Problems of Hospital Management

Mr. Herschel I. Stine, business manager of Harris Hospital in Fort Worth, Texas, presented Texas hospital pharmacists with a clear-cut view of hospital problems from a business standpoint. He explained that hospital management faces the same type of problems confronting any business, namely, assuring adequate income to meet expenses and provide for replacement of physical facilities and exercising efficient control of expenses.

Assuring adequate income is a problem complicated by an almost complete lack of sympathy for the problem itself. The public believes that hospital charges are much too high and that it should charge only the bare cost for service or medication. The universal attitude prevailing is that hospitals have "some mysterious providential source of unlimited funds."

Mr. Stine stressed that one of the most perplexing fiscal problems facing hospitals is the variation in patient load or occupancy, which corresponds to sales volume in commercial enterprise. Very little can be done to increase patient load or to reduce service cost in order to balance these variations in occupancy. These circumstances create a critical financial problem if the hospital is not subsidized by some organization.

When the revenue to be contributed by a particular department is considered, its share of the cost of all non-revenue producing departments must be included. If the pharmacy for instance must produce 15 percent of the gross operating revenue, then drug charges must be set to produce that amount.

Summarizing other fiscal problems of hospital management, Mr. Stine emphasized that collections, judicious purchasing and utilization of personnel should not be minimized.

Plastics in Pharmacy and Medicine

Dr. John Autian, associate professor of pharmacy at the University of Texas College of Pharmacy, addressed the group on the subject of plastics and their relation to pharmacy and medicine. Dr. Autian pointed out that the use of plastic devices, such as syringe or tubing, in hospitals has increased substantially in recent years. Safety of these devices has been promoted by manufacturers in terms such as "medical grade" or "hospital tested." Yet there is no national committee or group to set minimum standards for plastic medical devices.

The common belief that plastics are inert should be reevaluated. First, because the generic name plastic could include any polymeric substance and second, because there is evidence to prove that drug-plastic incompatibilities do exist. Also, some plastics might cause a sensitivity reaction on prolonged skin contact.

The medical center of the University of Texas at Galveston has established a committee to study the potential problems concerning plastics and establish minimum standards for plastic devices to be used in hospitals.

Business and Professional Relationships

"Harmony is the pleasing result of good business and professional relationship among members of the health team," stated Mr. Alfred A. Mannino, manager of the Hospital Sales Division of Geigy Pharmaceuticals. He emphasized his point by playing a recording of a popular song completely lacking in harmony. This displeasing arrangement was then compared to a harmonious recording of the same song.

Mr. Mannino, using excellent visual aids to highlight his point, reminded the audience that the next ten years will introduce many changes in the practice of pharmacy and medicine in general. "Pharmacists must accept this state of change and be prepared to cooperate with the other members of the health team to meet the demands of a rapidly increasing population."

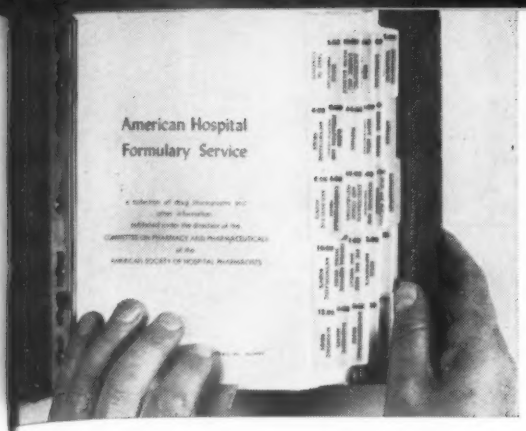
"The hospitals of tomorrow may be very different from today's typical health institution." Mr. Mannino illustrated this statement with an interesting set of slides showing hospital layout, use of electronic diagnostic aids and drug dispensers. "Many of these 'radical' ideas are actually being planned today, and you as hospital pharmacists should be studying and evaluating these new ideas."

Enrollees in the Texas Seminar also had an opportunity to participate in group discussions. Subjects covered included salaries for hospital pharmacists, utilization of lay personnel, hospital restrictions—how they affect medical service representatives, and Texas pharmacy law.

. . . . . .

National Hospital Week

May 7-13



AMERICAN HOSPITAL FORMULARY SERVICE

edited by WILLIAM HELLER, *Chairman ASHP Committee on Pharmacy and Pharmaceuticals*

► THE FIRST 1961 SUPPLEMENT to the *American Hospital Formulary Service,* dated February but not distributed until early in March, marks the beginning of the *Formulary Service's* third year. It also indicates our decision to renumber supplements at the beginning of each year and to supply a complete new index at that time. Six supplements to the *Formulary Service,* with increasing numbers of 32-sheet supplements, are again planned for 1961. As it has been some time since publication of a list of drugs with monographs in preparation, a partial list is included below.

Monographs on the following drugs are planned for inclusion in the Second 1961 Supplement, to be distributed in April:

aminoglutethimide (Elipten)
biperiden (Akineton)
dextromethorphan (Romilar) hydrobromide
diethylpropion hydrochloride (Tenuate, Tepanil)
diphenylpyraline hydrochloride (Diafen, Hispril)
glyceryl guaiacolate (Robitussin)
methylergonovine maleate (Methergine)
nylidrin (Arlidin) hydrochloride
oxethazaine (including Oxaine)
phenyramidol hydrochloride (Analexin)
potassium gluconate (Kaon)
sodium levothyroxine (Synthroid Sodium)
spironolactone (Aldactone)
tetrahydrozoline (Tyzine, Visine) hydrochloride

Although the content of the Third 1961 Supplement, a 32-sheet supplement planned for June, may change somewhat, the supplement will include monographs on most of the following drugs:

azuresin (Diagnex Blue)
boric acid
carbol-fuchsin solution (Carfusin, Castellani's paint)
*coal tar
ethchlorvynol (Placidyl)
*ethisterone (Lutocylol, Ora-Lutin, Pranone, Progestoral)
hexylcaine (Cyclaine) hydrochloride
hydroxyprogesterone caproate (Delalutin)
medroxyprogesterone acetate (Provera)
mepivacaine (Carbocaine) hydrochloride
methandrostenolone (Dianabol)
methohexital (Brevital) sodium
methyl salicylate
norethindrone (Norlutin)
*norethynodrel (including Enovid)
oxyphenonium (Antrenyl) bromide
paromomycin (Humatin)
plague vaccine
pramoxine (Tronothane) hydrochloride
*progesterone (Lipo-Lutin, Proluton)
progestogens, the (general statement)
proparacaine (Ophthaine) hydrochloride
tridihexethyl (Pathilon) chloride
triparanol (MER/29)
trolnitrate phosphate (Metamine, Nitretamin)
yellow fever vaccine

*Revised monograph

Numerous other monographs, too many to mention here, are in earlier stages of preparation. A questionnaire sent in October, 1960 to all hospitals having 25 or more subscriptions to the *Formulary Service* has been extremely helpful in planning monographs for future supplements. We welcome suggestions from any subscriber at any time as to appropriate monographs for the *Formulary Service.*

Price Reductions

► CONSIDERABLE INTEREST in large-volume purchases of the *Formulary Service* has resulted in the adoption of further reductions in the price of large orders. The new price structure is as follows:

1 to 9 copies	$15.00 per copy
10 to 24 copies	$14.50 per copy
25 to 49 copies	$14.00 per copy
50 to 99 copies	$13.50 per copy
100 or more copies	$13.00 per copy

The initial price continues to include supplement service for the calendar year. The price of the continuing supplement service remains the same, with no reductions below $4.50 yearly per subscription for 25 or more subscriptions.

The price of the *Formulary Service* without binder has been lowered from $13.00 to $12.00 per copy, or $3.00 less per book without binder on all orders.

The above prices are effective as long as the present supply of books and binders remains. When binders are reordered and when the *Formulary Service* is reprinted, it may be necessary to adjust prices to reflect new costs.

These price reductions have been made possible by the continued increase in subscriptions and the economies resulting from a large volume operation.

as the president sees it—

CLIFTON J. LATIOLAIS, *Ohio State University Health Center, Columbus, Ohio*

► IT HAS BEEN STATED that one of the "disadvantages" of being President of the SOCIETY is that one does not have a chance to learn how to be a president. Nevertheless, in spite of the short SOCIETY year, it was an extremely interesting and stimulating experience to serve you and your dynamic organization, even in a small way. On the one hand, it has been a difficult time due to the organizational changes in the SOCIETY and the Division last year. We missed the vast experience and background of our former Secretary Gloria Francke. On the other hand, it was a privilege for me to serve as President with your new Executive Secretary, Mr. Joseph Oddis, during his first year in office. You may rest assured that in Mr. Oddis you have excellent executive and leadership ability, dedication to purpose and unbounded enthusiasm for hospital pharmacy.

While the SOCIETY carries on a vast number of projects simultaneously through its committee structure, there are many other projects and activities which need to be accomplished. While the varied Committees have carried on their activities faithfully during the year, your Officers and Executive Committee have concentrated on other matters which needed attention. One such matter has been the reorganization of the administrative functions within the SOCIETY. This need has been quite well recognized for a number of years by past officers of the SOCIETY as well as the membership. The appointment of a full time Executive Secretary was an initial step in this reorganizational plan. During the past year I have worked very closely with the Executive Secretary to proceed with dispatch in this matter. Adequate space has been made available for the Office of the Secretary of the SOCIETY at the American Institute of Pharmacy which is the A.Ph.A. Headquarters Building in Washington. These offices provide, in an excellent way, for the adequate presentation of the SOCIETY and Hospital Pharmacy among the other segments of the profession in America today. If you have the opportunity to visit Washington, please make a special effort to visit the offices of your SOCIETY—you are most cordially invited to do so.

Another important step in administrative reorganization accomplished this year relates to the *American Hospital Formulary Service*. During its formative years, the AHFS's activities, because of necessity, were decentralized in Little Rock, at the Hamilton Press and in the Office of the Secretary. This year, it became possible to relocate the activities of the *Service* in the Washington office. Mr. George Provost, who is the full time Secretary of the *Service,* will move from Little Rock to the Washington Office. The business and financial activities carried on at the Hamilton Press will be centralized in the Office of the Secretary. All these things will provide for better coordination of SOCIETY activities and will result in improved services to the membership.

The financial management of SOCIETY activities are also in the process of administrative reorganization. The various SOCIETY accounts—*Formulary Service,* membership dues, THE JOURNAL, Whitney-Spease Scholarship Fund and Savings—will be centralized for better administrative coordination and fiscal responsibility.

Although space does not permit me to enumerate all the activities, these few examples serve to illustrate some of the many important matters to which your Officers and Executive Committee have devoted their time during the past year. For more complete details of all the SOCIETY activities for the past year, I suggest that you read the complete proceedings of the Annual Meeting which will appear in a forthcoming issue of THE JOURNAL. The primary purpose behind all these changes is to make it possible for developing an astute administrative organization within the SOCIETY in order that it may continue to expand its services to you—the membership. Thus, we ask your indulgence and solicit your wholehearted support in effectuating these essential programs.

Since this is my last column in "As the President Sees It" I want to take this opportunity to express my sincere personal thanks and professional indebtedness to you for the opportunity of serving you during this past SOCIETY year. I'm sure you all look forward, as I do, to hearing from your new President, Jack Heard, in this column during the coming year.

Clifton J. Latiolais

News

Pharmacist is Chosen "Employee of the Year"

► NELSON Y. KITSUSE, chief pharmacist of Louis A. Weiss Memorial Hospital, Chicago, has been unanimously acclaimed by his fellow employees as "Employee of the Year." Kitsuse is the Hospital's candidate for the Chicago Hospital Council's annual "Employee of the Year" awards contest. The winner of the city-wide "Employee of the Year" contest will be named at the Council's annual luncheon in May.

Kitsuse and the four runners-up for Weiss Hospital "Employee of the Year" were honored at a luncheon on Tuesday, March 21, at the Edgewater Beach Hotel. Kitsuse was presented a scroll, citing him for outstanding service to the hospital, and to his profession.

Kitsuse was chosen as a candidate by his fellow employees for his "outstanding personal integrity, dedication to duty, devotion to patients' welfare, and effective leadership in the hospital and in his profession."

A member of the American Pharmaceutical Association, the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS, and the Illinois Society of Hospital Pharmacists, Kitsuse has, over a period of years, taken an active part in the furthering of pharmacy as a career.

Kitsuse received his degree in pharmacy at the University of Southern California, and before coming to Weiss Hospital in 1953, worked in several other Chicago hospitals and clinics. He lives at 1344 W. Carmen, Chicago, with his wife and three children.

Sisters of Charity Pharmacy Institute

Hospital pharmacists of the Order of Sisters of Charity participated in a two-day Institute on Thursday and Friday February 9 and 10 at Providence Hospital in Washington, D. C. Nineteen Sister hospital pharmacists from throughout the eastern and central United States participated. The program included the following presentations:

"Standard Pharmacy Policy Resume," by Sister Elizabeth Ann.

"Product Promotion in Hospitals," by William B. Jacques.

"Pharmacology and Therapeutics of Fibrinolysin," by Dr. Nelson H. Schimmel.

"The Value of a Pharmacy Education Program for the House Staff," by Sister Anthony Marie.

"Form Standardization Report" by Sister Emmanuel.

"Pharmacy Forum." Panel members included Sister Emmanuel, Sister Elizabeth Ann, Mr. Eugene Chalfont, and Mr. Bruno Vignoni.

"Legal Aspects Involved in Dispensing Generic Name Drugs in Hospitals," by Dr. George Archambault.

"Sisters of Charity Pharmaceutical Purchasing Program Applied to Current Contracts," by Walter Stapleton and Sister Elizabeth Ann.

► ASHP PRESIDENT CLIFTON J. LATIOLAIS spoke on "Professional Survival—Its Dependence on Hospital Pharmacy," at the Eighth Annual Joint Pharmacy Seminar sponsored by the Michigan Branch of the American Pharmaceutical Association and the Wayne State University College of Pharmacy. The Seminar, following the theme "The Future of Pharmacy," was held at the McGregor Memorial Conference Center, in Detroit on February 28. Other participants included Ronald V. Robertson, President of the American Pharmaceutical Association, Henry H. Gregg, President of the American College of Apothecaries, and Ralph M. Ware, Jr., President of the National Association of Boards of Pharmacy. Other speakers were Hugh W. Brenneman, Public Relations Counsel for the Michigan State Medical Society and Austin Smith, M.D., President of the Pharmaceutical Manufacturers Association. Mr. John A. MacCartney, of Parke Davis and Company moderated a panel discussion following the presentation of papers.

► DR. JOHN G. ADAMS, formerly Dean of the Duquesne University School of Pharmacy, has been named to the faculty at the University of Connecticut. In this position, Dr. Adams will serve in a new research capacity carrying responsibilities for coordinating research in "bio-dynamics" at Connecticut's new Pharmacy Research Institute. His principal field of scientific research has been in the area of chemical structure and biological activity.

Replacing Dr. Adams at Dusquesne will be Dr. John S. Ruggiero, who received his Ph.D. from the University of Connecticut.

► E. M. BLUESTONE, M.D. of the Montefiore Hospital in New York City will receive the American Hospital Association's Distinguished Service Award for 1961. Dr. Bluestone was Director of Montefiore Hospital for 22 years before his retirement in 1951. He is now "consultant for life" to the hospital. He is recognized for his outstanding work in the home care program.

The Distinguished Service Award is the highest honor conferred by the American Hospital Association and is given for outstanding leadership in hospital administration. Dr. Bluestone is the 26th recipient. The award will be presented during the American Hospital Association's 63rd annual meeting September 25-28 in Atlantic City, N. J.

► "TARGET—INFLAMMATION. . . AGENT—CHYMOTRYSIN," is the title of a motion picture which has been made available by Armour Pharmaceutical Company of Chicago for distribution to professional medical groups and medical schools.

The film, in color, shows and discusses inflammatory reactions in a wide variety of conditions frequently encountered by the general practitioner and specialist. Chymotrypsin is an enzyme derived from beef pancreas and seems to offer great promise in combatting inflammation.

Copies of the film may be obtained by contacting Armour Pharmaceutical Company, Box 511, Kankakee, Ill.

► REMO FARIAS has been named director of sales for Lakeside Laboratories, Inc., Milwaukee, Wisconsin. In this newly created position, Mr. Farias will plan, coordinate and direct all activities for the Lakeside sales organization. Prior to joining the company, he served for three years as general sales manager for the Armour Pharmaceutical Company.

► JOHN S. GLEASON, JR., has been recently named Administrator of Veterans Affairs. Mr. Gleason, a native of Chicago, will be in charge of the approximately 172,000 employees of the Veterans Administration which has an annual expenditure of approximately five billion dollars along with the responsibility for administering laws applying to eligible beneficiaries among the nation's nearly 22,500,000 veterans.

► GEORGE F. ARCHAMBAULT, pharmacy director, Hospital Division, U. S. Public Health Service, was among the guest commentators participating in a Symposium on "New Challenges in Health, Welfare and Business," held by the Drug, Chemical and Allied Trade Association in New York City on March 2. Dr. Archambault participated in a discussion on "What Is Industry's Responsibility to the Public Welfare?" along with other commentators, including Bert C. Goss, president, Hill & Knowlton, Inc.; Henry Hazlett, contributing editor, *Newsweek;* Dr. Bernard L. Oser, president, Food and Drug Research Laboratories, Inc.; and Dr. Selman Waksman, director emeritus, Institute of Microbiology, Rutgers University. The discussion leader was Kenneth Mulford, counsel, Atlas Powder Company.

► SYLVESTER H. DRETZKA, president of the Wisconsin State Board of Pharmacy, and its secretary for 23 years, was recently honored at the annual meeting of the Boards and Colleges of Pharmacy of District IV at Purdue University in Lafayette, Indiana. Dretzka, whose current Board appointment expires in April of this year, will be completing 25 years of service with the Board.

► THE AMERICAN SOCIETY OF PHARMACOGNOSY will hold its annual summer meeting (Plant Science Seminar) at the University of Houston College of Pharmacy in Houston, Texas, June 19, 20 and 21.

► "PHARMACEUTICAL ABSTRACTS" is the title of a compilation of abstracts made available through the College of Pharmacy at the University of Texas. Formerly known as "Unpublished Abstracts of Articles on Pharmaceutical Subjects," the current volume is referred to as Volume 2, Issue No. 1 and includes abstracts 1 through 173. The cost of the single issue is $1.50 to cover printing costs and mailing and orders may be sent to the College of Pharmacy, University of Texas, Austin 12, Texas.

► THE CANADIAN INSTITUTE OF HOSPITAL PHARMACY will be held in Hamilton, Ontario August 11, 12 and 13. Accommodations for Institute enrollees are being made at McMaster University in Hamilton. Additional information regarding the Institute of the Canadian Society can be secured from David J. Sutherland, Publicity Chairman, Department of Pharmacy, Hamilton General Hospital, Hamilton, Ontario.

THE 21ST INTERNATIONAL CONGRESS of Pharmaceutical Sciences will meet in Pisa, Italy September 4-8, 1961. The Congress is sponsored every other year by the Scientific Section of the International Pharmaceutical Federation. Further information and the necessary application forms can be obtained from either the General Secretary, Prof. Dott. A. E. Vitolo or Prof. Dr. R. DeFazi, Chairman of the Organizing Committee, both located at Piazza Carrara, 10 Pisa, Italy.

► THE *American Druggist Blue Book*, 1961-1962, has recently been made available. According to a release, a record number of products—178,310—are listed. New features of this edition enhance its value and usefulness as a reference book. The service, including the manufacturer's catalog or list number with the names of the products, has been expanded.

Prepared primarily for the retail pharmacist, the book is made available without charge to every retail pharmacy. Additional copies are available at $9.00 each from the Circulation Department, American Druggist Blue Book, 250 West 55th Street, New York 19, N. Y.

► *Consultant* IS THE NAME of a new publication made available from Smith Kline and French Laboratories to practicing physicians throughout the country. Consultant is designed to disseminate important and helpful medical information—which can be applied in everyday practice—in a highly readable and easily digested style.

SELECTED PHARMACEUTICAL ABSTRACTS

and summaries of other articles interesting to hospital pharmacists

edited by NORMAN HO

BIS-PHENOLS, ACTIVITY OF

Chemical Structure and Antimicrobial Activity of Bis-phenols, Gump, W. S., Walter, G. R., Am. Perfumer Aromat. 75:33 (Sept.) 1960.

A selected group of 64 bis-phenols were synthesized and tested against *S. aureus, E. coli,* and *Trichophyton mentagrophytes.* Their antiseptic values were compared with hexachlorophene. Antimicrobial activity was tested in A.O.A.C. agar and Sabouraud's dextrose agar by serial dilution technique. It was found that the bis-phenols are rather specific in having a greater antibacterial activity against gram-positive than gram-negative organisms. The presence of soap always lowers the inhibitory level against *S. aureus.* Linkage in the 2,2'-positions and halogenation are essential for maximum activity. Only 2,2'-methylenebis (3,4,5-trichlorophenol) was found to be more potent than hexachlorophene; however its manufacture would be difficult and costly.

FRANZ W. GEISZ

CHELATION

The Avidity of Salicylic, Gentisic, and Salicyluric Acids for Heavy Metal Cations. Pecci, J. and Foye, W., J. Am. Pharm. Assoc., Sci. Ed. 49:411 (July) 1960. (Department of Chemistry, Massachusetts College of Pharmacy, Boston, Mass.)

It has been suggested that salicylates may exert some, if not all, of their biological effects through their ability to chelate the ions of metals. Potentiometric titrations were carried out with salicylic, gentisic, and salicyluric acids in the presence of Cu^{++}, Fe^{+++}, Al^{+++}, Co^{++}, Ni^{++}, Zn^{++}, Mg^{++}, Ca^{++}, and Ag^{+}. Salicylic, gentisic and salicyluric acids were found to form stable chelates with Cu^{++}, Fe^{+++}, and Al^{+++}. No evidence of chelation was observed with the other ions. The order of chelate stability in decreasing order was found to be salicyiic, gentisic, salicyluric acid, and Fe^{+++}, Al^{+++}, Cu^{++}.

LAWRENCE J. RASERO

EPHEDRINE GEL FORMULATION

A New Concept in Ephedrine Gel Formulation, Saski, W., Drug Standards 28:79 (May-June) 1960. (College of Pharmacy, University of Nebraska, Lincoln, Nebr.).

The problem of varying consistencies of gels formed from natural products is eliminated by substituting Carbopol 934. Ephedrine in the form of its base acts as the neutralizing agent for gel formation. Use of the base eliminates need for common alkaline agents whose use has resulted in degradation of the Carbopol 934 on exposure to daylight. The gel formed is elegant in nature and appearance has a stable, barely acidic, pH, and is stable to repeated autoclaving. Gel consistency is maintained over a wide pH range (5-11) with proper neutralization. A satisfactory gel is also obtained with atropine. Possibly other preparations may be developed. Another application is in the prevention of excoriation of the skin about surgical incisions by pH adjustment to destroy enzymatic activity.

CHARLES J. HARTLEIB

STERILIZATION

Sterilization of Pharmaceutical Products in an Electric Oven, Wain, E. D., F.P.S., Public Pharmacist 17:229 (Aug.) 1960. (Leicester General Hospital, Leicester, England.)

Several factors influence the time taken for a preparation to reach sterilization temperature after the oven reaches this temperature. This time-lag may be determined by the use of thermocouples placed in the preparations being sterilized. Determinations for different products of varying load sizes, at different oven temperatures were carried out. Time-lag varies considerably with different preparations, is greatly increased with increasing the size of the load, and by decreasing the temperature of the oven. Radiation appears to play an important part in heating in this type of oven. In many instances the actual oven temperature was not reached by the load making it necessary to use a higher temperature also. This may result in damage by overheating. The use of a circulating fan results in much improved performance. To ensure proper sterilization in an electric hot air oven, trials must be performed for each preparation to accurately determine its respective time-lag, the operating temperature must be considerably higher than that required for sterilization of the preparation, and containers must be adequately spaced.

CHARLES J. HARTLEIB

TABLET SHELF LIFE PREDICTIONS

Heating and Cooling Rate Coefficients and Related Factors Affecting Procedures for Tablet Shelf Life Predictions, George M. Irwin, Stuart P. Erickson, and Joseph V. Swintosky, J. Am. Pharm. Assoc., Sci. Ed. 49:632 (Oct.) 1960. (Research and Development Division of Smith, Kline and French Laboratories, Philadelphia, Pa.)

A quantitative study is described of the effects of tablet size, coating, bottle size, position of tablets in bottle, and position of bottle in carton on the heating and cooling characteristics of tablets. Also discussed are how the tablet heating and cooling characteristics, storage, oven operation, temperature, and other matters pertaining to the programming of an exaggerated temperature stability study may influence the accuracy of shelf life predictions of medications in tablet form.

It has been suggested that, in doing exaggerated temperature studies, errors in estimation of shelf life might result if no consideration was given to the slow heating and cooling processes characteristic of most pharmaceutical solids. Therefore a new term, known as the "equilibrium temperature time equivalent" or ETTE, was introduced. This term expresses the actual storage time of a product at a given temperature, corrected for the effects of the finite times required for heating or cooling to an equilibrium temperature. ETTE was determined for individual tablets by using imbedded thermocouples. Using the ETTE concept, calculations were made showing the magnitude of errors that can occur in studies of drug degradation and product shelf life when oven storage times are not corrected for the effects resulting from the heating and cooling processes.

INFECTIONS DUE TO CONTAMINATED DRUGS

Infections Due to Contaminated Drugs Prepared in Hospital Dispensaries, Fiebig, A., Kedzia, W., Lewonowa, A., and Barteczko, I., Acta Pol. Pharm. 5:411 (May) 1959. (Department of Applied Pharmacy of the Medical Academy, Gdansk.)

Many authors are trying to detect the sources and ways of cross-infection caused by *Micrococcus pyogenes,* which is resistant to antibiotics and is encountered in pediatrics and obstetrics wards, as well as in operation theatres.

The authors, supposing that the preparation of drugs in hospital dispensaries might be one of the ways of spreading these infections, decided to determine whether the antibiotic-resistant strains of *Micrococcus pyogenes* are found in these drugs and in what ways they become contaminated. The investigation revealed the presence of *Micrococcus pyogenes* coagales (+), resistant to antibiotics.

As regards the possible sources of infection, the above-mentioned strains were found in the air of the dispensaries, in the water, in the ointment base, on the surface of the glassware, in the noses and throats of personnel and on the sleeves of protective coats.

AUTHOR'S SUMMARY

POLAROGRAPHIC DETERMINATION OF 5-NITROFURAN DERIVATIVES

Polarographic Determination of 5-Nitrofuran Derivatives; Quantitative Determination of N-(5-Nitro-2-Furfurylideno)-1-Aminohydantoine (Furin) in Drugs and in Urine, Marciszewski, H., Acta Pol. Pharm. 1:27(Jan.) 1960. (Analytical Laboratory, Institute of Pharmacy, Warsaw.)

The polarographic behaviour of N-(-nitro-2-furfurylideno)-1-aminohydantoine was examined at the dropping mercury electrode. The above mentioned compound gives two waves, the first of which may be used with satisfactory results for the quantitative estimation. The half-wave

potentials have been stated in the *p*H limit 1.9—6.7 in a Britton-Robinson buffer solution and it was noticed that *p*H has no influence on the character of the diffusion current.

There has also been examined and described the polarographic estimation of furins in urine and this thanks to the advantages of this method may play an important role in clinical research.

AUTHOR'S SUMMARY

DETERMINATION OF LOW-MOLECULAR WEIGHT QUATERNARY AMMONIUM COMPOUNDS

The Selective Determination of Isopropamide Iodide, A Low-Molecular Weight Quaternary Ammonium Compound, Ralph S. Santoro, J. Am. Pharm. Assoc., Sci. Ed. 49:666 (Oct.) 1960. (Smith, Kline and French Laboratories, Philadelphia 1, Pa.)

This paper describes an indicator extraction method to determine isopropamide iodide selectively and its use in the determination of certain other low-molecular weight quaternary amines in the presence of amine base. Here the substance was complexed with methyl orange in *p*H 10.2 buffer and then extracted into chloroform. Re-extraction of the color into 1N hydrochloric acid and subsequent determination with a Klett-Summerson photoelectric photometer gave quantitative results. Calibration curves for other short chain quaternary amines were determined and compared to a known solution of methyl orange. Agreements with the theoretical value was obtained down to tetra n-propyl ammonium iodide. This method is rapid, sensitive and reproducible. Primary, secondary, tertiary amines and alkaloids do not interfere.

AL CURTIS

EUCALYPTOL DETERMINATION

The Determination of Eucalyptol by Residual Titration with Hydrogen Bromide in Acetic Acid, Martin I. Blake and Gilbert Rabjohn, J. Am. Pharm. Assoc., Sci. Ed. 49:650 (Oct.) 1960. (School of Pharmacy, North Dakota Agricultural College, Fargo.)

The authors present an assay procedure for the quantitative determination of eucalyptol as the free compound, in the form of eucalyptus oil, and when combined with other medicinal substances. Eucalyptol is an inner ether type compound and this is a modification of the Durbetaki method used earlier for direct visual titration of oxirane oxygen in epoxy type compounds.

Samples are titrated with an excess of HBr reagent and then allowed to set for 48 hours, the reaction time being slow. Unreacted HBr is then titrated with a solution of sodium acetate in acetic acid, using methyl violet as an indicator. The procedure is accurate and simple.

AL CURTIS

PHYSIOLOGIC AVAILABILITY OF ENTERIC COATED DRUGS

The Relationship Between Physiological Availability of Salicylates and Riboflavin and In Vitro Disintegration Time of Enteric Coated Tablets, Morrison, A. B., and Campbell, J. A., J. Am. Pharm. Assoc., Sci. Ed. 49:473 (July) 1960. (Food and Drug Laboratories, Department of National Health and Welfare, Ottawa, Ontario, Canada.)

Studies were conducted to relate the *in vitro* disintegration time of enteric coated tablets with physiological availability of salicylates and riboflavin, as determined by the urinary excretion of these drugs by human subjects. *In vitro* disintegration times were determined by the procedure given in U.S.P. XV Second Supplement, modified by the use of 60 minutes time in simulated gastric juice. Rates of urinary excretion of the drugs were determined after dosing subjects with 7 salicylate preparations and 5 riboflavin preparations. Two products were found which disintegrated after less than 30 minutes in simulated gastric juice, while a third product was extremely resistant to the simulated digestive juices, and, in fecal recovery studies, was recovered intact from the feces. Studies on rate of urinary excretion of the drugs indicated delayed absorption from the enteric coated preparations. Salicylate tablets with *in vitro* disintegration times as long as 213 minutes were fully available *in vivo*, whereas a riboflavin preparation with an *in vitro* disintegration time of 128 minutes was only 41% available *in vivo*. It is suggested that enteric coated tablets should withstand the action of simulated gastric juice for at least 60 minutes, to ensure that these preparations do not disintegrate in the stomach. Furthermore, until quantitative *in vivo* data are available for individual drugs, it is suggested that to ensure full availability enteric coated preparations, other than salicylates, should disintegrate within 30 minutes in simulated intestinal juice.

AUTHOR'S SUMMARY

ASSAY FOR BITHIONAL

Assay for Bithional in Liquid Soaps, Matuszak, J. B., Bope, F. W., and Harris, L. E., Drug Standards 28:63 (May-June), 1960. (College of Pharmacy, Ohio State University, Columbus, Ohio.)

Bithional, a bis-phenolic compound, may be determined by special spectrophotometric assay without separation from the liquid soap base. The Childs and Parks differential method (modified by Van der Pol) of determining the absorption of a dilution of the substance at an alkaline *p*H in the solute cell against its same concentration at an acid *p*H in the solvent cell was adapted to the assay for bithional. Determinations were performed using several different soap bases. The decomposition of bithional by direct sunlight was studied. Results of the assay determinations indicate acceptable accuracy and precision.

CHARLES J. HARTLEIB

CURRENT LITERATURE

. . . also calling your attention to the following articles appearing in recent hospital and pharmaceutical journals

. . . . . .

ADMINISTRATION

—General

Best, Jim: Work Simplification in the Hospital Pharmacy, *Hosp. Pharm.* (Canada) 14:15 (Jan.-Feb.) 1961.

—Cost of Medications

Bowles, Grover Jr.: Pharmacist Has an Important Role in Keeping Drug Costs Reasonable, *Modern Hosp.* 96:134 (Mar.) 1961.

—Packaging

Bell, Roderic M.: A Drug Prepackaging System Geared to Outpatient Needs, *Hospitals* 35:77 (Feb. 16) 1961.

—Records

Vance, Joe: Electronic Processing in Pharmacy, *South. Hosp.* 29:55 (Mar.) 1961.

EDUCATION

Hughes, F. Norman: Pharmaceutical Education for the Future, *Hosp. Pharm.* (Canada) 14:11 (Jan.-Feb.) 1961.

FLOOR PLANS AND PLANNING

Research and Planning Committee (Guild of Public Pharmacists of Great Britain): Organisation and Lay-Out of the Hospital Pharmacy, *Public Pharmacist* (Great Britain) 18:24 (Feb.) 1961.

LAWS AND REGULATIONS

Johnson, Emmett R.: What the Law Prescribes for Pharmacists, *Modern Hosp.* 96:118 (Feb.) 1961.

LIBRARY AND REFERENCE

—Includes pharmacist as a consultant . . .

Allen, F. A. D.: The Filing of Technical Literature—2, *Public Pharmacist* (Great Britain) 18:32 (Feb.) 1961.

Miller, Marvin L.; Expanding Role of the Community Pharmacist . . . Source of Information to the Physician, *J. Am. Pharm. Assoc.* NS1:151 (Mar.) 1961.

PHARMACY AND THERAPEUTICS COMMITTEE

Bowles, Grover Jr.: Physician, Nurse and Pharmacist Need to Understand Stop Orders, *Modern Hosp.* 96:92 (Jan.) 1961.

Bowles, Grover Jr.: Pharmacy and Therapeutics Committee Has Many Functions, *Modern Hosp.* 96:132 (Feb.) 1961.

OPHTHALMIC SOLUTIONS

Kleinmann, Kurt and Huyck, C. Lee: Preparation on a Small Scale . . . Ophthalmic Solutions, *J. Am. Pharm. Assoc.* NS1:162 (Mar.) 1961.

PARENTERAL SOLUTIONS

Whittet, T. D.: The Unusual Thermolability of the Pyrogens in London Tap Water, *Public Pharm.* (Great Britain) 18:18 (Feb.) 1961.

POSITIONS

in hospital pharmacy

The Personnel Placement Service is operated without charge for the benefit of hospitals and pharmacist members of the American Pharmaceutical Association and the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS. The ultimate purpose is the improvement of pharmaceutical services in hospitals, by more adequately fulfilling hospital pharmacy personnel needs and by locating positions which provide challenging opportunities for pharmacists who have indicated an interest in a hospital career.

By participating in the service, the hospital indicates a desire to achieve a pharmaceutical service which meets the Minimum Standard for Pharmacies in Hospitals. A description of the position should be submitted to the Division of Hospital Pharmacy on the forms provided. The hospital will receive applications directly from the applicant. The hospital agrees to reply to each application received and to notify the Division of Hospital Pharmacy when the position is filled.

The pharmacist, by participating, agrees to submit a Personnel Placement Service Information Form to the Division of Hospital Pharmacy. The applicant will then be notified of openings listed with the Service as they become available and can negotiate directly with the hospital if he is interested. It is agreed that the Division of Hospital Pharmacy will be notified as soon as a position is accepted.

A listing of positions open and wanted will be made regularly in the AMERICAN JOURNAL OF HOSPITAL PHARMACY without charge. Neither the name of the hospital offering the position nor the name of the applicant will be listed, except by code. All inquiries should be directed as shown below, including the code number.

Address all inquiries to
Division of Hospital Pharmacy
2215 Constitution Avenue, N. W.
Washington 7, D.C.

positions open

STAFF PHARMACIST—350 bed general hospital. Duties include filling prescriptions, preparing floor supplies and stock solutions, maintaining records and other related duties. B.S. and registration in Missouri required. Forty hour week, liberal employee benefits. PO-266

STAFF PHARMACIST—667 bed teaching hospital. Duties include filling of outpatient and inpatient prescriptions, special requisitions, floor stock and manufacturing. Registered or eligible for registration in Connecticut. Male preferred. Forty hour week, vacation, sick leave and retirement program. PO-265

DIRECTOR, PHARMACEUTICAL SERVICES—600 bed general teaching hospital. Assume responsibilities for pharmacy, central sterile supply, and teaching to School of Nursing and professional staffs. Must be eligible for Ohio registration. Liberal employee benefits. PO-264

CHIEF PHARMACIST—250 bed chronic hospital. Duties include dispensing of drugs to nursing stations, manufacturing, ordering, maintaining records. Must be eligible for registration in Pennsylvania. Forty hour week, vacation, and other liberal benefits. PO-263

CHIEF PHARMACIST—185 bed general hospital located in Virginia. In charge of pharmacy, purchasing, personnel, dispensing and other controls. B.S. required, and at least one year's experience. Forty-four hour week, vacation. PO-262

STAFF PHARMACIST—950 bed general hospital. Duties include filling prescriptions and some manufacturing. Registration in Minnesota required. Forty hour week, vacation and other benefits. PO-261

STAFF PHARMACIST—400 bed general hospital. New hospital scheduled to open Summer 1961. Duties include compounding and dispensing drugs, medicines and pharmaceutical supplies. Supervising prepackaging program, small out-patient clinic. B.S. degree and registration in Ohio required. Forty hour week, vacation. PO-260

CHIEF PHARMACIST—450 bed hospital in New Jersey. Duties include compounding and dispensing medicines and preparations, preparing and sterilizing injectible medications manufactured in hospital and other related duties. Male or female. B.S. required. Forty hour week, liberal personnel policies. PO-259

CHIEF PHARMACIST—837 bed general hospital. Duties include supervision, purchasing, etc. Will also serve as secretary of therapeutics committee. Must have B.S. and registration in Connecticut. Forty hour week, three weeks' vacation and other personnel policies. PO-258

ASST. CHIEF PHARMACIST—272 bed general hospital. Opportunity to help organize a new hospital pharmacy just in the process of opening. Duties include compounding and dispensing prescriptions, providing information to nurses and physicians, some teaching and will be in charge of dept. in chief pharmacist's absence. Must be registered or eligible for registration in Kentucky. Liberal employee benefits. PO-257

STAFF PHARMACIST—700 bed University teaching hospital. Duties include inpatient and outpatient dispensing. B.S. required. Must be registered or eligible for registration in Wisconsin. Forty hour week, vacation and insurance program. PO-255

ASST. CHIEF PHARMACIST—317 bed general hospital located in Delaware. Duties include assisting chief pharmacist in carrying out procedures and policies. Male preferred with internship, preferably M.S. degree. Forty hour week, vacation and liberal personnel policies. PO-254

STAFF AND ASST. CHIEF PHARMACISTS—600 bed general hospital located in suburb of Chicago. Filling patient prescriptions. Forty hour week. Excellent personnel policies. PO-252

REGISTERED PHARMACIST—154 bed general hospital primarily for care of Samoan people. Complete charge. Free medical and hospital care. Ten weeks' paid leave at termination of two year contact. Single person preferred. Send resume, experience, education, availability and salary requirements to: Personnel Officer, Government of American Samoa, Pago Pago, American Samoa. PO-251

STAFF PHARMACIST—237 bed general hospital. Duties include filling patient drug orders, outpatient prescriptions and assisting chief pharmacist. B.S. degree and registration in Iowa required. Forty hour week, vacation and sick leave. PO-250

STAFF PHARMACIST—525 bed general hospital located in Ohio. Duties include filling prescriptions for patients, floor stock and clinic patients. Must be registered in Ohio. Forty hour week, vacation and personnel policies. PO-249

CHIEF PHARMACIST—60 bed general short-term hospital. Pharmacist will be completely responsible for the operation of the pharmacy dept., including purchasing drugs and supplies and the preparation of monthly reports. Will also be responsible for meeting with the pharmacy and therapeutics committee making suggestions and recommendations for pharmacy procedures. Must be registered in California. Liberal personnel policy. PO-248

STAFF PHARMACIST—240 bed general hospital expanding to 300 beds. Male or female. Must be registered in Tennessee. Forty hour week, vacation and liberal benefits. PO-247

STAFF PHARMACIST—700 bed general hospital. Duties include dispensing drugs from the central and clinic pharmacies. Registration in Georgia required. Male or female. Liberal personnel policies. PO-245

STAFF PHARMACIST—275 bed private hospital in Chicago. Applicant will compound and dispense drugs and medicines. Must be licensed in Illinois. Forty hour week, vacation and other liberal benefits. PO-243

STAFF PHARMACIST—520 bed general private hospital. Duties include compounding and dispensing medicines and preparations according to prescriptions. Female preferred. Must be registered or eligible for registration in Washington State. Forty hour week, vacation and other liberal benefits. PO-242

STAFF PHARMACIST—350 bed general hospital located in Florida. Dispensing patient drug orders and related duties. Must be eligible for registration in Florida. Forty hour week, vacation, holidays, sick days, group insurance and retirement. PO-238

ASST. CHIEF PHARMACIST—650 bed general hospital located in Nebraska. Duties include refilling patient orders, floor supplies for nursing stations and compounding supplies. Forty hour week, vacation. PO-236

STAFF PHARMACIST—350 bed general hospital. Applicant will assume some supervisory responsibility. B.S. required. Must be registered or eligible for licensure in Ohio. Forty hour week, vacation, sick leave, holidays and group hospitalization. PO-235

CHIEF PHARMACIST—120 bed general hospital located in Kansas. Pharmacist will organize pharmacy department and assist in teaching pharmacology to student nurses. Must be registered or eligible for licensure. Forty-four hour week, vacation, liberal benefits. PO-230

STAFF PHARMACIST—550 bed teaching hospital located in Virginia. No experience necessary. Female preferred. Forty hour week, vacation and liberal benefits. PO-226

CHIEF PHARMACIST—general hospital located in West Virginia. Pharmacist will be under direct supervision of the administrator, filling prescriptions and allied duties; planning; organizing; and directing pharmacy and central sterile supply in accordance with established policies. B.S. required. Forty hour week, liberal benefits. PO-225

CHIEF PHARMACIST—100 bed general hospital located in Ohio. Applicant must have organizational ability and will assume administrative responsibilities of the dept. Must be registered. PO-224

CHIEF PHARMACISST—Psychiatric hospital located in Ohio. Must be registered in Ohio. Forty hour week, vacation and retirement benefits. PO-221

ASST. CHIEF PHARMACIST—200 bed general hospital located in Connecticut. Duties include filling of medication orders, preparing stock drugs and filling inpatient and outpatient prescriptions. Forty hour week, two weeks vacation and sick leave. PO-218

ASST. CHIEF PHARMACIST—500 bed general hospital located in Iowa. Will assist chief pharmacist and will be responsible for the operation of the pharmacy dept. in the absence of the chief pharmacist. Forty hour week, vacation, sick leave and holidays. PO-205

ASST. CHIEF PHARMACIST—238 bed general hospital located in Michigan. Duties include dispensing, controlling pharmacy divisions on nursing units, and assuming responsibility of the pharmacy in absence of chief pharmacist. Forty hour week, vacation, holidays and sick leave. PO-204

ASST. CHIEF PHARMACIST—204 bed hospital. Duties include dispensing, receiving, and labeling drugs, etc.; furnishing information to physicians and nurses; teaching student nurses; and being responsible as an assistant department head in administrative and other related duties. Forty hour week, vacation, insurance and sick leave. Must be eligible for registration in Illinois. PO-203

CHIEF PHARMACIST—104 bed general hospital. Direct pharmacy with the help of full-time registered nurses and assist in the purchase of medical and surgical supplies. Forty hour week, vacation and sick leave. Located in a University town in Illinois. PO-202

STAFF PHARMACIST—790 bed hospital. Duties include handling and filling of inpatient and outpatient departmental orders, outpatient prescription and bulk manufacturing. Must be registered or eligible for registration in Ohio. Male preferred. Forty hour week, vacation, holidays and pension plan. PO-194

ASST. CHIEF PHARMACIST—225 bed general hospital in Hawaii. Assist chief pharmacist, charge of dept. in chief pharmacist's absence, and supervisory responsibility. Must be eligible for licensure in Hawaii. Forty hour week, vacation, holidays, annual sick leave, insurance and retirement plan. PO-191

CHIEF PHARMACIST—2300 bed mental hospital. Pharmacist will have complete charge of pharmacy, drug orders, stocking, dispensing, compounding necessary records and other pharmacy duties. Must be licensed in Ohio. Forty hour week, vacation, holidays, insurance, retirement plan and sick leave benefits. PO-189

STAFF PHARMACIST—400 bed general hospital located in Michigan. Excellent opportunity in an expanding pharmacy program. Liberal benefits. PO-185

CHIEF PHARMACIST—264 bed general hospital located in Texas. Plans and directs pharmacy policies, compounds and dispenses medicines, purchases supplies and materials, maintains records, and prepares periodical reports. Must be eligible for or have M. S. Degree. Forty hour week, vacation, retirement, sick leave and insurance plan. PO-177

STAFF PHARMACIST—200 bed general hospital. Duties include compounding, dispensing and manufacturing. Applicant must have B. S. in Pharmacy and be registered in Connecticut. Recent graduate acceptable. Forty-four hour week, vacation, pension plan and hospitalization. PO-168

STAFF PHARMACIST—100 bed general hospital located in Texas. Assume personal responsibility for accurate filling of prescriptions and supplies, assist in inspecting drugs in nursing stations, replace stock taken from night emergency container, inspect and refill opthalmic solution trays from operating room, emergency room, and central supply. Female preferred. Must be registered or eligible for registration in Texas. Forty hour week, vacation, holidays and sick leave. PO-164

ASST. CHIEF PHARMACIST—280 bed general hospital. Duties include filling prescriptions and medication orders from various units, supervise pharmacy clerks, assume administrative responsibility when chief pharmacist is absent. Forty-four hour week, sick leave and holidays. Must be registered in Illinois. PO-161

STAFF PHARMACIST—Unique, new 400 bed general private hospital where pharmacists join the doctor-nurse team by working in a dispensing unit location on each 100 bed nursing unit or in the central pharmacy. The dispensing unit personnel have responsibility for providing drugs, oxygen, dressing trays, I V solutions and similar items. A total of sixteen staff pharmacists is required to staff the hospital. Applicants must be eligible for registration in California. Excellent opportunity; generous benefits. PO-148

STAFF OR ASST. CHIEF PHARMACIST—150 bed general hospital located in New Mexico. Generous benefits. PO-134

STAFF PHARMACIST—500 bed general hospital located in Oklahoma. B. S. required. Forty hour week. PO-95

ASST. CHIEF PHARMACIST—237 bed general hospital in West Virginia. Female desired. Forty-four hour week, vacation. PO-77

positions wanted

ASST. CHIEF OR CHIEF PHARMACIST—Male, married. Obtained B. S. in 1954 at University of Cincinnati College of Pharmacy. Three years' hospital pharmacy experience. Prefers to locate in Texas or Hawaii. Registered in Ohio. PW-313

ASST. CHIEF OR CHIEF PHARMACIST—Male, single. Obtained B. S. in 1960 at Oklahoma University. Two years' hospital pharmacy experience. Prefers to locate in the Southwest. Registered in Oklahoma. PW-312

ASST. CHIEF OR CHIEF PHARMACIST—Male, single. Obtained B. S. in 1959 and will obtain M. S. in August at State University of Iowa. Two years' hospital pharmacy experience. Serving hospital pharmacy internship. Prefers to locate in Midwest or West. Registered in Iowa. PW-311

ASST. CHIEF OR CHIEF PHARMACIST—Male, married. Obtained B. S. in 1958 at Rutgers University College of Pharmacy. Three years' hospital pharmacy experience. Prefers to locate in Mideast. Registered in New Jersey. PW-310

ASST. CHIEF OR CHIEF PHARMACIST—Male, married. M. S. expected in June 1961. Served hospital pharmacy internship. Two years' hospital pharmacy experience. Prefers to locate in Midwest or East. Registered in Iowa but willing to reciprocate. PW-309

STAFF OR ASST. CHIEF PHARMACIST—Female, single. Obtained B. S. in 1959 at Texas Southern University. Hospital pharmacy experience. Served hospital pharmacy internship. Prefers to locate in the West. Registered in Texas. PW-308

STAFF PHARMACIST—Male, married. Obtained B. S. in 1940 at Brooklyn College of Pharmacy. Will locate anywhere. Registered in New York, Pennsylvania, New Jersey and Florida. PW-307

STAFF PHARMACIST—Male, single. B. S. obtained in 1960 at Texas Southern University. Will locate anywhere. Registered in Louisiana and in the process of being registered in Oklahoma. PW-306

CHIEF PHARMACIST—Male, married. Obtained B. S. in 1952. Served hospital pharmacy internship. Five years' hospital pharmacy experience. Interested in teaching. Will locate anywhere. Registered in Nebraska, Iowa, New Mexico and South Dakota. PW-305

CHIEF PHARMACIST—Male, married. B. S. obtained in 1957 at University of Cincinnati. Four years' hospital pharmacy experience. Prefers to locate in the Midwest. Registered in Kentucky and will soon be registered in Colorado. PW-304

CHIEF PHARMACIST—Male, married. Will obtain M. S. in June of 1961. Serving hospital pharmacy internship. Hospital pharmacy experience. Will locate anywhere. PW-303

STAFF PHARMACIST—Male, married. Obtained B. S. in 1960. Hospital pharmacy experience. Prefers to locate in the West. Registered in Texas. PW-302

ASST. CHIEF OR CHIEF PHARMACIST—Male, married. Obtained B. S. in Organic Chemistry in 1941 and B. S. in Pharmacy in 1953. Five years' hospital pharmacy experience. Prefers to locate in Michigan or Colorado. Registered in Michigan. PW-301

CHIEF PHARMACIST—Male, married. B. S. obtained in 1955 and M. S. in 1957 at University of Michigan. Served hospital pharmacy internship. Hospital pharmacy experience. Willing to locate anywhere. Registered in Michigan and Kentucky. PW-300

STAFF PHARMACIST—Male, married. Obtained B.S. in 1959. Will obtain M.S. in 1961 at University of Florida. Two years' hospital pharmacy experience. Serving hospital pharmacy internship. Prefers to locate in the West, North or East. Registered in Florida. PW-299

STAFF PHARMACIST—Male, married. B. S. obtained at Texas Southern University, Houston in 1960. Will locate anywhere. Registered in Texas. PW-298

ASST. CHIEF OR CHIEF PHARMACIST—Female, single. B. S. obtained at Ohio State University College of Pharmacy in 1954. Five years' hospital pharmacy experience. Prefers to locate in the Midwest or East. Registered in Illinois and Ohio. PW-297

STAFF OR ASST. CHIEF PHARMACIST—Male, married. B. S. obtained in 1952 at Idaho State College. Prefers to locate in California. Registered in Idaho, Utah, Washington, Oregon and California. PW-296

STAFF PHARMACIST—Female, single. B. S. obtained in 1956 at Philadelphia College of Pharmacy and Science. Hospital pharmacy experience. Prefers to locate in the Los Angeles, California area. Registered in Pennsylvania and eligible for registration in California. PW-295

CHIEF PHARMACTIST—Male, married. B. S. obtained at the Philadelphia College of Pharmacy and Science in 1951. Nine years' hospital pharmacy experience. Prefers to locate in the North, Midwest or in the West. Registered in Pennsylvania and Delaware. PW-294

CHIEF PHARMACIST—Male, married. B. S. obtained at the University of Illinois. Extensive hospital pharmacy experience. Presently completing a four-year curriculum in Business Administration at North Western University. Prefers to locate in the Chicago, Illinois area. Registered in Illinois, Arizona and California. PW-291

ASST. CHIEF OR CHIEF PHARMACIST—Male, married. Obtained M. S. at Philadelphia College of Pharmacy. Served hospital pharmacy internship. Three years' hospital pharmacy experience. Prefers to locate in Connecticut. Registered in Connecticut and Pennsylvania. PW-290

ASST. CHIEF OR CHIEF PHARMACIST—Male, married. Obtained M. S. at the University of Iowa in 1958. Served hospital pharmacy internship. Military obligations completed. Hospital pharmacy experience. Prefers to locate in the West. Registered in Colorado and Iowa. PW-289

ASST. CHIEF OR CHIEF PHARMACIST—Male, married. B. S. obtained at University of Illinois. Extensive hospital pharmacy experience. Prefers to locate in the East or Midwest. Registered in Illinois. PW-287

STAFF OR ASST. CHIEF PHARMACIST—Male, married. Obtained B. S. in 1954 at Rutgers College of Pharmacy. Hospital pharmacy experience. Prefers to locate in Florida. Registered in Florida, New Jersey and New York. PW-286

ASST. CHIEF OR CHIEF PHARMACIST—Male, married. B. S. received at Purdue University in 1944. Served hospital pharmacy internship. Extensive hospital pharmacy experience. Will locate anywhere. Registered in Indiana, Michigan and Wisconsin. PW-285

STAFF OR ASST. CHIEF PHARMACIST—Male, single. Obtained B. S. in 1959 at the University of Colorado. Completed hospital pharmacy internship at Denver General Hospital in June 1960. Prefers to locate in the West or Midwest. Registered in Colorado. PW-284

ASST. CHIEF OR CHIEF PHARMACIST—Female, married. B. S. obtained in 1954. Six years' hospital pharmacy experience. Prefers to locate in New York, New Mexico, Texas and Louisiana. PW-282

CHIEF PHARMACIST—Male, married. Obtained B. S. in 1953 at St. John's College of Pharmacy. Seven years' hospital pharmacy experience. Prefers to locate in the Northeast. Registered in New York and New Jersey. PW-279

ASST. CHIEF OR CHIEF PHARMACIST—Male, married. Received at Ohio State University B. S. in Biology in 1952 and B. S. in Pharmacy in 1955. Five years' hospital pharmacy experience. Willing to locate in the Eastern, Northern or Western part of the country. Registered in Ohio. PW-277

ASST. CHIEF OR CHIEF PHARMACIST—Female, single. B. S. obtained in 1956 at University of Wyoming. Working towards M. S. at the University of Maryland. Served hospital pharmacy internship. Hospital pharmacy experience. Prefers to locate in the West. Registered in Wyoming. PW-276

STAFF OR ASST. CHIEF PHARMACIST—Female, married. B. S. obtained in 1954 at St. Louis College of Pharmacy. Six years' hospital pharmacy experience. Prefers the Northwestern part of the country, but willing to locate anywhere. Registered in Missouri. PW-275

ASST. CHIEF OR CHIEF PHARMACIST—Male, single. M. S. obtained in 1958 at University of Texas. Served hospital pharmacy internship. Hospital pharmacy experience. Prefers to locate in the Southwest. Registered in Kansas and Texas. PW-270

ASST. CHIEF OR CHIEF PHARMACIST—Male, married. B. S. obtained in 1955 at the University of Nebraska. Five years' hospital pharmacy experience. Prefers to locate in California. Registered in Nebraska and California. PW-269

ASST. CHIEF OR CHIEF PHARMACIST—Female, single. B. S. Degree. Fifteen years' administrative and practical experience in hospital pharmacy. Prefers Midwest, particularly Illinois or Wisconsin. Registered in Virginia, Illinois, Wisconsin and Michigan. PW-268

CHIEF PHARMACIST—Male, single. Obtained M. S. in 1954 at University of Tennessee. Served hospital pharmacy internship. Six years' hospital pharmacy experience. Prefers to locate in the Southwest or in Florida. Registered in Connecticut and New York. PW-266

CHIEF PHARMACIST—Male, married. M. S. obtained in 1957 at Nebraska University College of Pharmacy. Served hospital pharmacy internship. Six years' hospital pharmacy experience. Prefers to locate in the West or Midwest. Registered in Colorado, Missouri and Nebraska. PW-265

CHIEF PHARMACIST—Male, married. Obtained M. S. in hospital pharmacy at State University of Iowa in June 1959. Served hospital pharmacy internship. Three years' hospital pharmacy experience. Will locate anywhere. Registered in Illinois. PW-264

CHIEF PHARMACIST—Male, married. B. S. Served hospital pharmacy internship. Extensive hospital pharmacy experience. Prefers to locate in the Midwest. Registered in Ohio. PW-263

CHIEF PHARMACIST—Male, married. B. S. Fourteen years' hospital pharmacy experience. Prefers to locate in the East or Midwest. Registered in Pennsylvania and West Virginia. PW-260

ASST. CHIEF PHARMACIST—Male, single. Obtained B. S. in 1956 at Purdue University. Hospital pharmacy experience. Prefers position with some administrative and/or teaching duties. Would like to locate in Northeast or Southwest section of country. Registered in Texas. PW-256

ASST. CHIEF OR CHIEF PHARMACIST—Male, married. Obtained B. S. in 1954 at South Dakota State College. Two years' hospital pharmacy experience. Will locate anywhere. Registered in South Dakota. PW-247

STAFF PHARMACIST—Male, married. Received B. S. in June 1960 at Philadelphia College of Pharmacy and Science. One year's hospital pharmacy experience. Prefers to locate in Philadelphia. PW-246

DIRECTOR OF PHARMACY SERVICES—Male, single. Received B. S. in 1956 at the University of California. Served hospital pharmacy internship. Four years' hospital pharmacy experience. Registered in California. Prefers to locate in California. PW-237

PHARMACIST—Female, single. M. S. received at University of Maryland in 1951. Served hospital pharmacy internship. Five years' hospital pharmacy experience. Prefers to locate in New Jersey. Registered in Pennsylvania and Missouri. PW-225

ASST. CHIEF OR CHIEF PHARMACIST—Male, married. B. S. received at Detroit Institute of Technology in 1950. Four years' hospital pharmacy experience. Prefers to locate in Michigan. Registered in Michigan. PW-224

ASST. CHIEF OR CHIEF PHARMACIST—Male, married. Received B. S. at Medical College of South Carolina in 1950. Four years' hospital pharmacy experience. Prefers Southeast section of country. Registered in North Carolina and South Carolina. PW-221

STAFF OR CHIEF PHARMACIST—Male, single. B. S. received in 1952 at St. Louis College of Pharmacy. Two years' hospital pharmacy experience. Registered in Missouri. Prefers to locate on the West Coast. Particularly California. PW-217

STAFF PHARMACIST—Female, single. B. S. Seven years' hospital pharmacy experience. Southwest section of country preferred. Registered in Alabama and Georgia. PW-199

ASST. CHIEF OR CHIEF PHARMACIST—Male, married. M. S. obtained in 1956 at Columbia University College of Pharmacy. Hospital experience. Prefers to locate in California. Registered in New York, Michigan, New Jersey and Florida. PW-184

ASST. CHIEF OR CHIEF PHARMACIST—Male. B. S. received in 1954. Desires to locate in Michigan, Ohio and Illinois. Registered in Michigan. PW-177

CHIEF PHARMACIST—Male, married. B. S. Ten years' hospital pharmacy experience. Registered in Mass., Ill., Mo., Ky., Tenn., and Virginia. PW-150

ASST. CHIEF OR CHIEF PHARMACIST—Male, single. Registered in D. C., Ill., Md., and Penna. Graduate University of Pittsburgh in 1953. Experience in research. Prefers North and East. PW-148

CHIEF PHARMACIST—Male, married. Graduate of St. Johns University College of Pharmacy. Extensive experience as chief pharmacist and purchasing agent. Prefers to locate in New York or New Jersey. Registered in New York and New Jersey. PW-144

CHIEF PHARMACIST—Female, single. Registered in Pennsylvania and Ohio. Twelve years' hospital pharmacy experience as a chief pharmacist. Desires to locate in Pennsylvania or Ohio. PW-111

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